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TOTAL QUALITY MANAGEMENT

A GUIDE TO IMPLEMENTATION

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FOREWORD AND ACKNOWLEDGMENTS

We have prepared this guide to aid DoD in its Total Quality Management (TQM) implementation effort. Specifically, this guide is directed toward increasing individual awareness of TQM and of the need for continuous improvement throughout the DoD and Defense industry. While middle and upper management and leadership may find our discussions particularly helpful in beginning their TQM efforts, the principles and actions we address can be used by people at any level in an organization. We often speak directly to TQM in the Defense context, but our discussions have meaning for every organization contemplating a continuous-improvement effort. We hope you find the guide useful in beginning your own journey of improvement.

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CONTENTS

CHAPTER 1

INTRODUCTION

Whoever we are, it is often easy to fall into the trap of thinking that our organization is too big to be affected by our individual actions. That perception is common and frustrating, and fortunately, it is a false one. Only through the collective efforts of their individual members do organizations change; organizations are incapable of changing themselves.

Whatever your position in an organization, your efforts to perform a job and to improve that performance directly affect the influence you will have in the organization, the control you will have over your personal situation, and your ability to manage and lead. Combined with the efforts of others, your effectiveness directly influences the organization's overall ability to meet its mission and ultimately affects our performance as a nation. Furthermore, how we perform today will also affect future generations.

Total Quality Management (TQM) is a means for improving personal effectiveness and performance and for aligning and focusing all individual efforts throughout an organization. It provides a framework within which you may continuously improve everything you do and affect. It is a way of leveraging your individual effort and extending its effect and its importance throughout an organization and beyond.

Total Quality Management is not a destination but a journey toward improvement. This guidebook will help you get started on that journey. It will help you understand the benefits of continuous improvement and your role and responsibilities in leading the improvement effort in your organization. In it, we briefly explore why continuous improvement is important to each of us. We offer a brief overview of TQM, describe a core set of individual and organizational behavior that has proven key to successful improvement efforts, and offer a general model for your improvement effort. This guide will serve as a frame of reference for the ongoing dialogue about TQM within DoD and its supplier community. And, finally, it will

help you set the direction for your own journey of improvement. As you read these words, your journey has begun.

DEFINITION

Let's begin our discussion by defining TQM. It is both a philosophy and a set of guiding principles and practices that represent the foundation of a continuously improving organization. It applies human resources and quantitative methods to improve the material and services supplied to an organization, all the processes within an organization, and the degree to which the needs of the customer are met now and in the future. It integrates fundamental management techniques, existing improvement efforts, and technical tools in a disciplined and focused continuous improvement process.

Total Quality Management addresses the quality of management as well as the management of quality. It involves everyone in an organization in a systematic long-term endeavor to develop processes that are customer oriented, flexible and responsive, and constantly improving in quality. *Quality* includes any factor of product or service of value to a customer. Ultimately, TQM is a means through which an organization creates and sustains a culture committed to continuous improvement.

CHALLENGE

We are entering a challenging period in our history. The challenges that face us will test our nation, our organizations, and each of us individually as managers and leaders. Those challenges arise from a revolution of information technology that is fundamentally and permanently changing how we do work. The dislocations that are already becoming apparent are or will be as profound as those that marked the transition from the Agricultural Age to the Machine Age. Those who can recognize the importance of these changes and that can adapt to meet them will be the leaders in this new age. Those who are too slow to learn and adapt will face great difficulty.

It is apparent to most of us that an ever-increasing rate of technological change is an inescapable world reality. More technological change has occurred in our lifetime than in all of preceding history. The same will be true for the lives of our children and grandchildren. The systems of management that were adequate in the early 1900s will not meet the tougher tests that we and our children face. The shortcomings of the current management systems are already evident in dislocations manifest as lack of competitiveness, declining manufacturing capability, and lost leadership in key technologies.

As America's largest organization, DoD has begun to face this challenge in part through its TQM initiative. The task ahead is not an easy one. As DoD seeks to transform and continuously improve how it does business, it is simultaneously confronted with ever-increasing weapon system complexity and cost, increasingly constrained budgets, a growing diversity of threat technologies, and a narrowing technological and qualitative edge over potential adversaries. To meet that challenge, DoD must look to you, its leaders in the Military Services and defense industries, to bring to bear the best available management technologies to make possible the essential transformation.

Organizational transformation starts with your individual initiative and leadership. That leadership is essential, especially at the top of the organization, but also at every level and in every area. If we are to succeed, every member of the defense establishment must become involved in the effort. At the core of this guide is the message that we must not wait for the organization to guide us toward change; rather, we, as individuals and as teams, must lead and help to transform our organization through learning and adapting.

The challenge therefore is a personal one. You must decide how and when to begin your

journey toward continuous improvement. Your future and that of your organization will both be influenced by your decision.

BACKGROUND

Technological developments have been the precursors of each of the major world transformations we characterize as an age. In the past the people alive at the dawning of an age were largely unaware of the events that would ultimately alter the lives of their offspring. The processes of cultural transformation in all previous ages were relatively slow and their impact on societies gradual and diffuse. We are witnessing the birth of a "Systems Age" that will replace the "Machine Age" spawned by the Industrial Revolution. The very technologies that are the precursors of the Systems Age make it possible for us to become rapidly aware of events and make it inevitable that our lives, not just those of our descendants, will be forever changed.

The end of an age does not occur with the throw of a switch. Rather one age fades into the next and is characterized by people struggling with the problems of the new age using the tools, techniques, and paradigms of the past age. These struggles are marked by the cultural dislocations that occur as societies attempt to adapt to the new world reality. Eventually those societies that successfully develop and adapt new and more appropriate tools, techniques, and cultural paradigms emerge as leaders. Often the rise and fall of nations is a function of their ability to adapt to the world's technological transformations.

Many of us are still employing the tools, techniques, and paradigms of the Machine Age as we begin to deal with the problems and complexities of the new Systems Age. The management methods that still predominate are based on the theories of Taylor, Galbraith, Skinner, and other pioneers of Machine Age scientific management. Those approaches were reductionist in nature and patterned on the very machines that shaped the age. They were characterized by breaking things down into their fundamental elements and by making each element optimal. These approaches were appropriate for their time but they did not result in optimal systems. Dr. Russell Ackoff illustrates that point with the following example: Suppose you were to acquire all the makes of automobile produced in the world and systematically select from the set the best carburetor, transmission, brakes, and so forth. When you attempt to assemble the world's best possible automobile from the collection of best parts, however, you would not even be able to produce an automobile because the parts would not fit. The performance of the whole is not the sum of the performance of the parts; it is a consequence of the relationship between the performance of the parts.

Machine Age management technology does not enable us to synthesize and understand information in sufficient breadth to comprehend the relationships of performance among the parts to permit the system to be effectively optimum. As illustrated in Figure 1-1, performance dramatically improved during the Machine Age but was constrained by the limitations inherent in making optimum the performance of each of the parts. The tools and techniques associated with information technology have made it possible to deal more effectively with the larger and more complex management of whole systems. The philosophy of management most appropriate for the new age has only begun to evolve. However, we are better able to focus on its elements as organizations around the world experiment with alternative management approaches. Many of the new management principles are based on the theories of Deming, Juran, Ishikawa, and other pioneers of Systems Age management methods. Performance has again begun to climb dramatically in those organizations that are

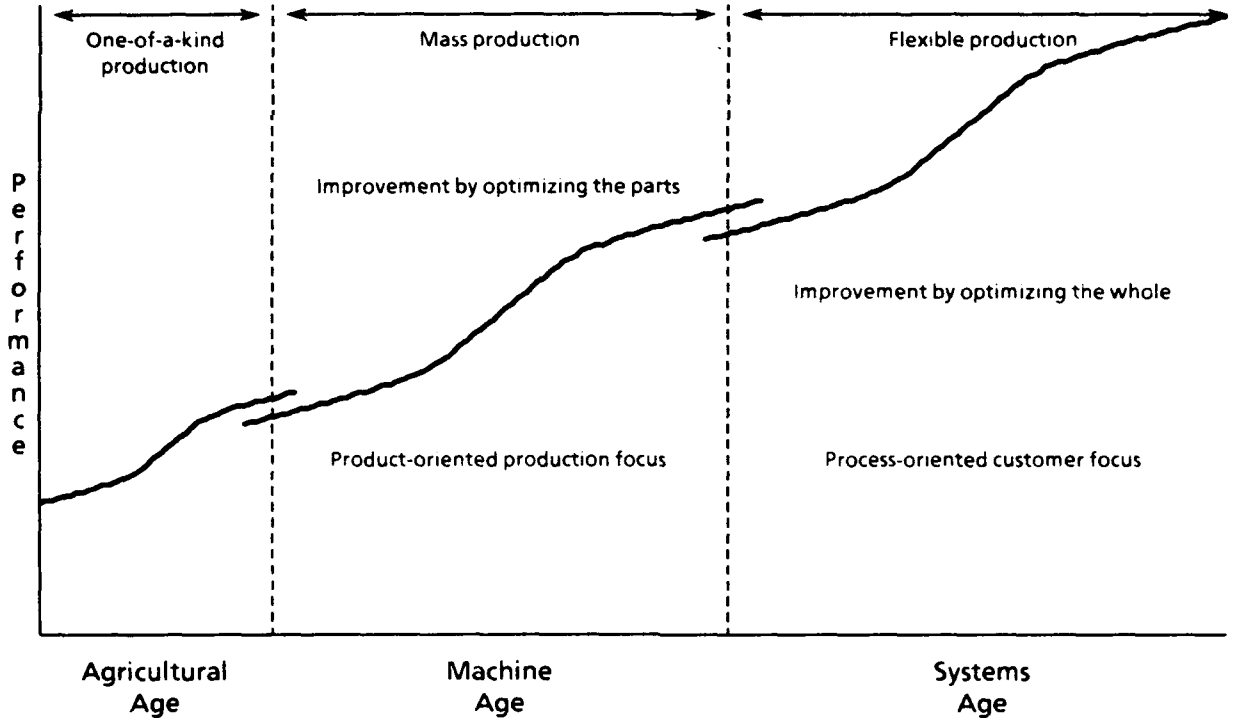

FIG. 1-1. PROFILE OF PERFORMANCE IMPROVEMENT

employing these Systems Age management technologies. Such pioneering organizations have demonstrated that significant continued performance growth is not only possible but that it is essential for survival in today's rapidly changing environment. We must recognize and apply the set of principles and practices that characterize the most successful organizations. Under TQM, DoD will encompass and integrate the variety of principles, practices, techniques, and tools being employed by the organizations that are leading the way in performance and quality improvement.

OVERVIEW

Under TQM, your organization will deliberately seek to create a positive and dynamic working environment, foster teamwork, apply quantitative methods and analytical techniques, and tap the creativity and ingenuity of all of your people. You will focus collective effort to better understand and meet internal and external customer needs and to continuously increase customer satisfaction.

The TQM philosophy provides a comprehensive way for you to improve performance and quality by examining the processes through which work gets done in a systematic, integrated, consistent, organization-wide manner. It includes understanding the concept of variation and its implications for process improvement. TQM addresses all forms of work and applies equally whether you are management and administration, conceptual worker, or touch labor.

Top management leads the improvement process, but each individual must commit to and participate in the effort. You must look to improving your own processes and modeling the way for others. You guide the effort by deliberately shaping the organizational

environment to stimulate creativity, pride, teamwork, and knowledge enrichment, and you aim at achieving a shared vision and fulfilling the mission of the organization. Management seeks to craft a totally integrated effort working toward improving performance at every level and in every activity. You focus on achieving top-level goals through tangible improvements in measured performance criteria such as, cost, schedule, human resource development, new product development, and ultimately customer satisfaction.

The principles at the heart of the continuous improvement process include

1. A constancy of purpose that provides a steady and consistent vision of where your organization is going
2. A commitment to quality that drives productive change in all the products and services you produce
3. A customer focus and customer involvement that ensures your improvement efforts are driven by meaningful purposes
4. Process orientation that addresses the means of work accomplishment and not just the outcomes
5. Continuous improvement that ensures dynamic and adaptive processes over time
6. System-centered management that ensures improvement of the whole and not just the parts
7. Investment in knowledge that leverages the effectiveness of the improvement process
8. Teamwork that leverages the knowledge and provides essential synergy
9. Conservation of human resources that preserves your organization's most valuable asset
10. Total involvement that brings the entire intellectual power of your organization to bear on improvement
11. Perpetual commitment that precludes giving up when the road gets a little rough.

You apply these principles together in a logical and holistic manner to give substance and vitality to the continuously improving organizational culture. A number of the suggested readings at the end of this document examine these principles and their supporting practices in depth.

No single correct formula can be used to achieve continuous improvement in all situations or all organizations A core set of ingredients, however, is evident in most successful continuous improvement efforts and can be applied to your own effort. Those ingredients have been translated into individual and organizational behavior and are presented in Chapter 2. Chapter 3 and Appendix A provide some guidance in the form of models for integrating and sequencing these elements into a structured improvement methodology.

Your TQM effort will be unique in its details but in general should move your organization toward satisfying the six criteria listed below.

1. Exceeding your customers' requirements and expectations and being a high-quality supplier

2. Believing in people, working to eliminate barriers that prevent people from taking joy and pride in their work, and involving everyone

3. Tapping the power of individuals, multiplying that power through training and teamwork, focusing that power on understanding and process improvement

4. Recognizing that most problems are in your systems and are not due to particular individuals or circumstances, and providing leadership to continuously improve the systems

5. Making decisions based on data rather than on opinions or emotions; stimulating creative thinking; and seeking innovation in products, processes, and services

6. Focusing more on defect prevention than on defect detection.

You may more easily satisfy these criteria by applying the 11 principles listed above.

SUMMARY

Quality is the essence of the emerging management philosophy for the Systems Age. We seek quality in products and services, processes, and approaches to management. The new philosophy recognizes that quality results in productivity and other associated benefits as illustrated by the Deming Chain Reaction[1] in Figure 1-2.

As the quality of products, services, processes, and management increases, waste and cost are reduced and productivity improves, making lower prices possible. Lower prices and quality goods and services generate the new business that is essential to staying in business and providing the jobs needed for a vibrant economy. Quality improvement makes a win-win situation possible for everyone involved. It is in our national interest to move toward higher quality through continuous improvement in all our defense-related activities.

Another version of the Deming Chain Reaction is shown in Figure 1-3; that figure depicts the potential benefits of increased quality in terms of the DoD acquisition process. Higher quality results in lower cost to the Government for its goods and services, which eventually results in more effective expenditures of resources and ultimately increased overall readiness and defense capability.

Total Quality Management affords you an even greater opportunity to make a difference. It can be a source of self-satisfaction and ultimately make jobs easier and more predictable. TQM

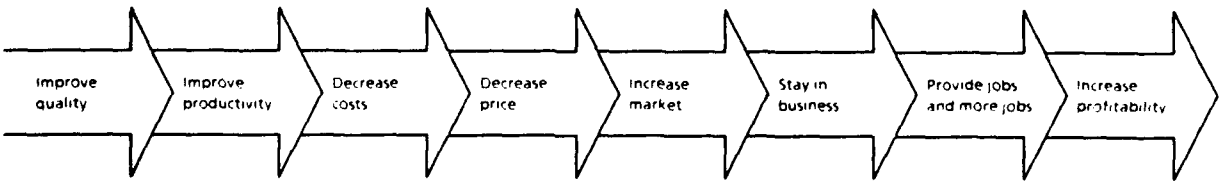

FIG. 1-2. DEMING CHAIN REACTION

[1]Scholtes, Peter R. *The Team Handbook*. Joiner Associates, Inc. Madison, Wis. 53705. Nov 1988.

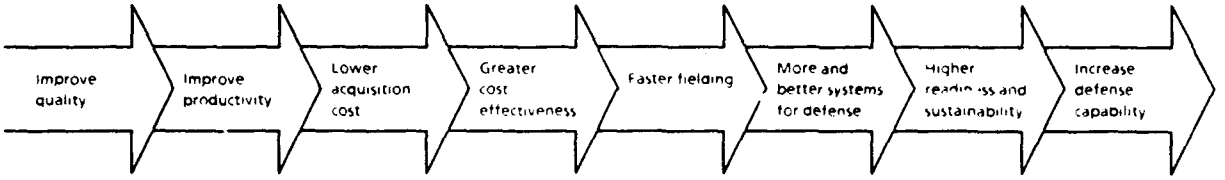

FIG. 1-3. CHAIN REACTION FOR DoD ACQUISITION PROCESS

efforts lead to workplaces that are more efficient, more effective, with more nurturing environments – places where people can increasingly take pride in their work.

This guide is intended to help raise TQM awareness among the members of the defense community and to encourage you to start your own personal journey of continuous improvement. It applies to anyone on the DoD team, Government or contractor, who is beginning the journey toward continuous improvement. You must start your journey in your own sphere of influence. A "General Strategy for Getting Started" and "A General Model for Improvement" are presented in the following pages as points of departure. The suggested reading presented in the reference material at the end of this document will assist you in making some of the decisions necessary to get started.

Your organization must weave the elements of TQM together into a seamless improvement process. It will need to create a custom-designed plan for improvement that mixes the TQM elements and techniques in ways best suited to its specific situation. However, your plan must include all the fundamental ingredients of the continuous improvement process if the effort is to succeed. Ultimately, success depends on a joint commitment from Government and industry. Every member of the DoD community needs to be involved. By beginning and leading your own TQM effort you will contribute to the success of that effort.

CHAPTER 2

GENERAL STRATEGY FOR GETTING STARTED

INTRODUCTION

Getting started with improvement would be easy if we didn't have so much work to do! But we have so much work to do precisely because we have not recognized the importance of continuously improving every system and process. We must get our systems under control and eliminate the sources of unnecessary and unproductive work. When systems and processes function properly, it is surprising how little work there is in anything.

Getting started and sustaining the early improvement initiative is the most difficult task in TQM. It requires us to make time in our already tight schedules to do something that we perceive to be an additional task. We must modify many of our long-held notions about what good management is all about in exchange for the promise of improvement. It is surprising that anyone is willing to take these first steps; however, many have already done so and been richly rewarded. By ultimately gaining real control over our work processes instead of permitting them to control us, we will make large gains.

Those who have blazed the trail toward continuous improvement have left us a legacy of many lessons learned. Many have had false starts, traveled down dead-end roads, and had to start over. If there is one consistent lesson from those who have led this effort, it is that there is no universal strategy for success. The road to continuous improvement is and must be an appropriately tailored and personal one. A general behavior and set of actions, however, characterize most successful efforts. That behavior and those actions are presented here as a suggested general strategy for starting your TQM journey.

While this section speaks directly to you, most behavior and many actions apply equally to your organization as a whole. The elements of this general strategy are listed somewhat in order of recommended implementation. The experience of many organizations is that focused application of specific improvement techniques and tools is most successful when done in an environment that consciously supports and

promotes continuous improvement. In this chapter, the earlier elements provide a foundation that is essential to successful process improvement efforts and to creating a culture of continuous improvement that will have long-term success and ultimately be self-sustaining. Some elements are necessary only during the initial phases, but most are periodic or continuous activities that should become routine, ongoing behavior by the organization or individual.

The elements fall into 12 areas of activity: (1) demonstrate leadership; (2) build awareness; (3) open and maintain lines of communication; (4) create a constancy of purpose; (5) focus on the customer; (6) choose early efforts in visible areas critical to success; (7) develop teamwork; (8) provide support, training, and education; (9) build trust and respect; (10) create an environment in which continuous improvement is a way of life; (11) continuously improve all processes; and (12) expand culture to suppliers. Each of those areas encompasses a number of actions.

DEMONSTRATE LEADERSHIP

Total Quality Management depends on people more than anything else, and people lead or are led, they are not managed. Effective TQM depends on effective leadership, and you must provide that leadership. By taking the initiative, providing an example, and showing the way, you can lead your subordinates and inspire your peers and even your superiors to follow your example. Top leadership is essential, but TQM leaders are needed at all organizational levels. Effective TQM leadership does not necessarily depend on your place in the organization but rather on your enthusiasm and your visible commitment to the process of continuous improvement.

> **"We need to be led by a vision of the future as opposed to being pushed by the problems of the present."**
>
> Methodist Bishop

1. Take the Initiative

Depending on your organization's experience and progress with TQM, you will be embarking on an effort that may seem strange to many. By taking the initiative you will establish momentum for your continuous improvement effort. Your public display of TQM behavior, belief in the philosophy, and demonstration of practices will reinforce your organization's interest and prove TQM's viability. You will become a TQM leader principally by virtue of taking the initiative for its implementation.

In taking the initiative, you should demonstrate the behavior you expect of your subordinates, and you must develop some expertise in that behavior before you attempt to train them in it and require it of them. Demonstrating TQM before mandating it will show your subordinates you are serious about its implementation and that you believe in its potential. You should apply continuous improvement philosophy and practice to the processes in which you directly participate. This application allows you to gain expertise and also demonstrates your sincerity; with it, you will be prepared to assist your subordinates in their own implementation and to share your own lessons learned.

Leading by example requires that you put in the time necessary to provide that example. You must make time to participate in improvement activities and support and guide the activities of your people. You must regularly visit your teams, not to check up on them but to show you are interested in their efforts and results. You must identify and remove barriers to their efforts.

2. Demonstrate Commitment

Leading the way in TQM means you must demonstrate your commitment to the TQM philosophy, principles, and practices in your

daily activities. Demonstration means living the beliefs you are trying to establish in others and exhibiting the behavior you wish them to adopt. Your commitment will be evidenced by your participation in TQM activities; by your willingness to lead your subordinates and enable them to improve their own processes; by your establishment of clear, achievable, agreed-upon improvement goals; by your unending commitment to the progress of improvement efforts; and by your continuing desire for improvement.

3. Create More Leaders

Leadership is not monopolistic; continuous improvement needs leaders at all levels in all parts of your organization. You may help create more leaders by giving your subordinates increased responsibility with commensurate authority to improve their processes and by providing the training and resources needed to carry out those improvements. Among your peers and with your superiors you will create more leaders when you build their awareness and when you demonstrate your own successful continuous improvement efforts. TQM directly depends on leaders; the more leaders you help create, the more successful TQM will be throughout your organization.

4. Guide the Efforts of Others

A key principle of continuous improvement is that people and groups learn through their mistakes when they have a basis for comparing actual and expected behavior. In leading the way you must be prepared to forgive mistakes made as people learn; people are always learning. Every improvement effort is a culmination of individual and group contributions, and your continued coaching will improve the contribution of every individual you help. TQM is about learning, and judgment often serves only to inhibit the learning process and gets in the way of improvement, while coaching encourages and contributes to continued learning, both for the student and for the coach.

Questioning is important to the cultural change within your organization. Through questions you can determine the logic of a process or the logic for improving a process and the data that support the logic. Questions are your key to changing the organizational environment. Continually reinforce the use of logic, data, and participation. Ask about barriers. Along with asking questions, you must listen to and assess the answers and act upon them.

Demonstrating your continuing interest and approval of your own and your subordinates' improvement activities, both individual and team, will keep all of you working hard to improve the processes you own. This demonstration is part of your own personal improvement process. You must show employees that you are committed to the improvement effort, that you recognize their achievements, that you are available to assist in providing expertise or removing roadblocks, and that you care about the results. Your own personal demonstration of this commitment will do more to ensure the success of the improvement effort than any single tool or technique you can implement.

5. Remove Roadblocks and Barriers

As a leader, you must remove roadblocks and barriers that impede the continuous improvement efforts of those you lead. Removing these impediments allows them to act, strengthens their abilities, and increases their will to improve. By identifying barriers and acting on them and on barriers identified by others, you will increase their sense of satisfaction and enable successful improvements.

Barriers may be physical or psychological. By eliminating or significantly reducing status symbols, you will give credibility to the concept of each individual's importance to the organization. Barriers between groups are similar to barriers between individuals, and you should focus on reducing and eliminating them as well. By structuring your improvement effort through team activity, you will do much to reduce barriers.

You should encourage your subordinates to identify those barriers that prevent them from reaching their goals, and you should do your best to eliminate those barriers; you should do the same with barriers you yourself perceive. This must be an ongoing effort because you will never eliminate all barriers and will have to fight to keep some of the barriers you have removed from returning.

BUILD AWARENESS

Building awareness – understanding what TQM is and why it is important to you and your organization – is one of the first and perhaps the most important step in implementing TQM. Every person in the organization must become aware of the need to improve, of the promise offered by TQM, of the various TQM methodologies, and of the tools available for improvement efforts. Awareness is the key that opens the door to TQM's potential.

> **"Awareness quickens the mental demand."**
>
> Henry James

1. Build Your Personal Awareness

Your own personal awareness is essential to your implementation of TQM. You have begun your journey of awareness by opening this guide, but you have just touched the tip of the iceberg. Understanding TQM's theoretical basis; learning the process improvement methodologies, skills, and techniques; sharing your awareness with your superiors and peers; and using it to guide your subordinates' improvement efforts are all means of extending that awareness into productive continuous improvement activity.

2. Read the Suggested Literature and View the Suggested Video Tapes

A wide body of literature addresses the theory that supports the TQM effort; the references at the end of this guide list fundamental books, articles, and video tapes that will help you build a broad foundation in TQM's philosophy, principles, and practices, and will provide you the keys to further sources of information and expertise. This foundation will enable you to build and guide a TQM effort that best meets the specific needs of your organization.

3. Attend TQM-Related Symposia, Workshops, and Conferences

Meetings, seminars, and classes offered by recognized leaders in TQM can also be instrumental in building your awareness. Not only will you benefit from the experience of course instructors, but you will find the experience of other attendees at conferences and workshops extremely valuable as you plan your own TQM approach. No two TQM efforts are exactly alike, but all offer common lessons and core skill requirements. Sharing your experience with others also can establish a continuing dialogue that will be mutually beneficial for years to come.

4. Help Your Manager Become More Aware

Your TQM effort begins with you. However, if you are not top management, your manager will play a major role in your success. Your manager can send signals or exhibit behavior that will either greatly enhance your TQM progress or unacceptably restrict it. By helping your manager become aware through summarizing your own TQM knowledge, advocating your manager's reading and attendance, and inviting his/her participation in

your TQM activities, you greatly improve your chances for a successful TQM effort. Through encouraging your manager's awareness, you also increase the potential to move the commitment to TQM upward in your organization.

5. Discuss TQM with Your Peers

Horizontal communication among peers is as important to TQM success as is vertical communication between superior and subordinate. Discussing TQM with your peers and spreading your enthusiasm for its potential and success encourages them to undertake their own efforts. From these combined efforts you can realize the benefits of learning common lessons or addressing problems and issues that affect you. A group of your peers who are equally enthusiastic about TQM can also impel your management to undertake a comprehensive TQM effort throughout the organization.

6. Help Subordinates Become More Aware

Ultimately, your subordinates will be an essential element in your TQM effort. With their help and support, you will implement the improvements you seek in your processes. You must provide the opportunity and conditions that enable that support. You may encourage subordinate awareness by making training classes, materials, and/or resources available; by having employees participate in improvement activities; and *most importantly, through your own demonstration of the improvement-oriented TQM behavior you wish them ultimately to exhibit.* Most great leaders lead by example. Your enthusiasm for TQM will be infectious; if your subordinates sense your belief and your commitment, they will be close behind.

7. Share the Concept with Union Leadership

Unions are powerful elements in an organization, are attuned to the attitudes and concerns of their membership, and have significant influence over their members' reactions to an organization's initiatives. You should involve union leaders by educating them about your objectives and the objectives of TQM in general, by setting common goals, and by joint management/union improvement activities. Union involvement, especially its early involvement, helps reduce fear of or resistance to TQM and increases the chances for full and uncompromised participation by your subordinates and peers. *When customers and employees are the most important part of our efforts, union and management have the same job.*

8. Inform Customers and Suppliers

A fundamental TQM principle is to build close relationships with customers and suppliers and maintain frequent contact with them. Starting these closer relationships can be as simple as telling your customers and suppliers that you are embarking on a TQM journey and that they can expect to have regular contact with you in the future. If they are not familiar with quality management ideas, you may want to offer them use of your educational materials (books, video tapes, and even spaces at seminars) and direct them toward other sources of information. Take the time to explain why you are making changes, what kind of efforts you foresee in the near and distant future, and how your activities will affect them. Make a special effort to listen to their ideas on how you can work closely and productively together.

OPEN AND MAINTAIN LINES OF COMMUNICATION

As you work on building awareness throughout your organization, begin to establish lines of communication both horizontally and vertically. Honest, open communication is probably the single most important factor in successfully creating a TQM environment. It will take time, but can lead to trust and mutual respect, and sometimes be the only thing that keeps the effort alive. If people keep talking to each other, they can work through problems, overcome barriers, and find encouragement and support from others involved in quality efforts.

> **"Men are never so likely to settle a question rightly as when they discuss it freely."**
>
> Lord Macaulay

1. Open the Communication Processes

Regardless of how good your leadership may be, a TQM effort is much harder without complete, clear communication. As a leader you must make that communication possible by listening to those with whom you interact, creating new channels of communication, and keeping those channels open.

Communication requires both a sender (talker) and a receiver (listener). As a leader, you should do a lot of listening; communication often involves knowing what questions to ask, asking them, *listening* to the answers you get, and acting on those answers. Communication must be free and open throughout your organization, both vertically and horizontally. Constrained communications quickly eliminate any atmosphere of trust in an organization, and you should ensure that individual and group access to other individuals and groups is as unrestricted as possible.

2. Keep Everyone Informed

Individuals are most dissatisfied when kept in the dark about the organization's goals, their superiors' objectives, or even what is expected of them personally. A fundamental TQM practice is defining an organizational vision that is shared by every individual in your organization. For your improvement effort to succeed you must enlist the support of all of your people. This will require you to share management information, goals, and objectives. Don't work with hidden agenda. Make your policy one of "no surprises" – your people will feel more secure, and they will contribute to the organization freely and openly.

CREATE A CONSTANCY OF PURPOSE

Constancy of purpose establishes a common direction for all organizational elements and ensures that efforts at all levels contribute to achieving broad objectives relevant to the entire organization. Communicating the organization's goals and objectives throughout the organization is essential to focusing improvement efforts for the common benefit. Your behavior and attitudes must reinforce this constancy of purpose, and you must be conscious of the unspoken signals you send your subordinates.

> **"Be like a headland of rock on which the waves break incessantly; it stands fast and around it the seething of the waters sink to rest."**
>
> Marcus Aurelius

1. Examine Your Organization's Mission

Your organization's mission is its conscious statement of its overriding goals and objectives. If no explicit statement is made, your organization and those of you that lead the organization may not be entirely clear about the mission. By assessing your vision of the organization's future and coming to a consensus on a mission statement, you will solidify your understanding of your ultimate goals, and communicate that mission throughout the organization. The mission statement should relate your organization's understanding of its purpose to your customers' needs, requirements, and expectations. It should convey a long-term stability and sense of purpose.

2. Take a Long-Term View

When you lead your TQM effort, you must be leading it *somewhere*. You have to establish a vision based on your organization's values and describe behavior that is consistent with your vision. You must communicate that vision of your organization's ultimate destiny and inspire others to strive to attain that vision. By appealing to others' values, interests, hopes, dreams, and other motivations, you will enlist them in the common drive for improvement. Your vision for continuous improvement must have at its heart the betterment of each individual with a stake in your organization, and you must clearly communicate that vision.

Strategic planning is the means by which you translate your organization's mission and vision into operational goals and objectives. That planning will help you chart a course toward the future, having as one of its primary elements an overriding mandate to improve all organizational processes.

3. Establish Meaningful Goals

The strategic planning process yields both long-term goals and specific goals that are the near-term opportunities for your improvement efforts. Perhaps the most important characteristic of your goals is that they be challenging as well as reasonable and achievable. You must develop realistic

strategies to realize them. In developing goals and their supporting strategies, you should focus on key accomplishments and then on the method of achieving those goals instead of the required results. Remember that the primary goal is continuous improvement leading to increased quality and customer satisfaction. Finally, once goals and strategies have been established, you need to use the continuous improvement process to achieve those goals and then establish and attain new goals continuously.

4. Effectively Deploy Policy Throughout the Organization

The best goals and objectives throughout your organization will be meaningless if they are not coordinated and aligned with your organization's mission. Policy deployment provides the means by which broad organizational goals are iteratively translated into more specific goals and objectives and eventually result in actual improvement efforts. Such deployment is best accomplished by viewing the organization as a linkage of processes, in which no individual or group operates in a vacuum. Goals are developed within the framework of that linkage. To enable policy deployment, you should develop and publish unifying posture statements to all the organization's members, and those statements should provide a context in which the members may view their individual and group goals and objectives.

5. Treat Goals and Performance Carefully

Since numeric goals are subject to much misuse, you must be very careful about how you use them. As people attempt to reach a numeric goal, they will have a choice of three methods:

1. Improve the system
2. Distort the system; get the demanded results at the expense of other results
3. Distort the figures.

In TQM we expect people to improve the system. However, if people are judged – rewarded or punished – based on achievement of results, they will often distort the system or distort the figures, both of which are major barriers to TQM. To help people improve the system, focus your reviews on *how* they are going about improving the systems rather than on *whether* goals are reached. When you are concerned about what people will do with numerical goals, do not use them.

6. Ensure That Behavior and Signals Are Consistent with Goals

Nothing will make a TQM effort more difficult than behavior that signals to the organization's members that you do not completely and entirely embrace the philosophy and behavior you advocate. You must ensure that all new policies and initiatives reflect the organization's mission and vision and are consistent with TQM principles and practices, and that old policies and initiatives are reconciled as well. Everything you do or say will be evaluated by your subordinates, peers, and superiors as to how it relates to your stated TQM objectives. Even informal or unspoken signals can contradict your words – you must establish your credibility through complete dedication and commitment to the TQM effort and ensure your behavior and signals reinforce that dedication and commitment.

7. Align Overall Improvement Activity with Organizational Goals

Your improvement activities, those of your subordinates, and those of every team in your organization are the means by which your organizational goals are realized. Aligning those improvement activities with the overall goals is therefore crucial to a successful improvement effort. When you ensure that process-improvement teams are linked vertically, you take a big step in that alignment. Higher level teams pass their own general goals down to lower level teams, with each team making more specific goals at its level. You can align goals horizontally through the interaction of cross-functional teams. Each team takes its goals and translates them into specific improvement objectives. Because of the tiered relationship of each team's goals, all improvement activities are aligned with overall organizational goals.

FOCUS ON THE CUSTOMER

Every process in your organization has a customer, and without a customer a process has no purpose. The customer is the recipient of the process's products or services and defines the quality of those products and services. It is only through focusing on your customers that you can truly optimize your processes because it is only through your customers that you may effectively define your goals and objectives for improvement. You must focus on both your organization's external customers and your internal customers, who are other members of your organization that depend on your products or services for their own processes.

> **"Quality has no meaning without reference to the customer."**
>
> Dr. W. Edwards Deming

1. Link Organizational Purpose to Customer Satisfaction

The customer defines the purpose of the organization and every process within it. Success means striving to become the best supplier of your particular products and services in the minds of those customers. To achieve that success, your organization must align its overriding strategic vision with a vision of customer service and satisfaction. Ultimately, you will ensure all organizational purposes aim at meeting your customers' needs and you will monitor your organization's performance to ensure this performance is maintained and improved. This approach to customer service applies to each organizational process with respect to its internal customers as well.

You should be measuring your improvement effort constantly within the context of your own processes; however, you must ensure that your perceived improvements are equally perceptible to your customers. Inquiring as to the suitability of your improvements or measuring key customer criteria should be part of the continuous dialogue you establish with your customers. Because the organization and its processes exist to serve the customer, your improvements are of no benefit unless they are directly passed to the customer in terms of higher quality products and services.

2. Identify External and Internal Customers

Identifying your customers is the first step in developing a customer focus. External customers can be easier to identify; they are outside your organization, and usually have formal relationships with your organization. Your internal customers are another matter. You must carefully assess your own processes and determine who in the organization receives their output and benefits from them. Who should benefit from them? These are your internal customers. Once you identify your customers, you should ensure they understand they are your customers.

3. Understand Customer Needs, Expectations, and Requirements

Satisfying your customers means that the products and services your processes generate meet your customers' needs. To ensure your processes meet those needs, you must first understand what the needs are. Your customers will have specific requirements that are peculiar to their own operations and concerns. They will expect a certain level of performance from you and from your products. They may also have implicit needs that they do not articulate but that are equally important. As a supplier, you have a responsibility to ensure that these customer needs, requirements, and expectations are communicated and that they are mutually understood and agreed upon.

4. Establish Routine and Meaningful Dialogue with Customers

Continuous, ongoing discussion of your customers' needs and how well you are meeting those needs is crucial to effective customer service. Customer needs are always changing as are your environment and the customer's environment. You must continually update your understanding of customer requirements in the context of a dynamic environment if you wish your products and services to be most useful to your customers. You must also communicate your own needs for information and feedback to your customers. Help them understand your processes and how their requests and timing affect your ability to be a good supplier.

5. Listen to the Customer

More important than merely talking to your customers is listening to your customers. You can only discover what your customers' true needs are by listening to and watching them. If possible, have them take you to their work areas and show you how they use your products and services. You will bring your own biases and preferences to any discussions or meetings, and those preferences will affect the course of any dialogue you undertake with your customers. To ensure you adequately understand your customers' own biases and preferences, you should listen before adding your own preferences to your discussion. By listening to your customers, you will also gain improved understanding of your own performance.

6. Involve the Customer in Planning and Decision Making

Planning and decision making can be much more effective when your customers are involved. That does not mean that they control or materially manipulate the planning process but rather that they communicate their needs in terms of your planning and strategic focus. Because they are the foundation of your goals and objectives, your customers can provide feedback and information that is beneficial to the overall planning process.

CHOOSE EARLY EFFORTS IN VISIBLE AREAS CRITICAL TO SUCCESS

The success or failure of your initial TQM efforts and projects can greatly affect how easily you can get your organization to adopt TQM ideas. It pays to choose these early efforts carefully, looking for opportunities that (1) have a good chance of success; (2) are visible throughout the company, and preferably, to important external customers; and (3) can significantly improve the lives of workers and managers alike. The trick is to find something that is neither so large that you are doomed to failure nor so small that no one will notice if improvements are made. A few guidelines are outlined below.

> **"Success comes from having the proper aim as well as the right ammunition."**
>
> Proverb

1. Address Critical Issues That Are Also Important to Customers

Addressing critical problem areas first or applying TQM in areas with high probability of success increases the chance that TQM results will sell themselves. You can build on the success of your initial efforts to mobilize the majority of your people. For many of them the tangible success of the philosophy will be much more meaningful than a verbal promise. Choosing problem areas or areas that are important to your customers will maximize your initial payback and will increase the attractiveness of TQM to your management. Appropriate recognition and reward of early successes will motivate others to join in the effort. The final incentive for a good early choice is that you will gain quick momentum and achieve tangible change when TQM is applied to critical areas.

2. Start with the Processes You Own and Work to Improve the System

Continuous improvement involves each individual and group within the organization improving its own processes. Beginning your TQM effort within your own span of control gives you the best chance for immediate, demonstrable success without threatening anyone else's domain, and allows you to demonstrate the ideals and behavior you seek to inspire in others. You should begin your own process improvement effort by determining exactly which processes you own and following a systematic, methodical approach to improve those processes and communicate the results.

3. Start the Process at the Highest Level Possible

The higher in the organization you can begin implementing continuous improvement the greater your chances of success. Top management comprises your organization's most visible leadership. Also, they know your external customers and they understand your organization's significant strategic processes. If you are not the top leader in your organization, you should promote the promise of TQM to the highest audience you can reach. You should at least make a concerted effort to convince your superior that implementing TQM is not only a worthwhile effort but the key to your future success. Through your superior you may be able to convince higher levels of management.

Ideally, your improvement effort should start at the very top of your organization. This may not always be possible, however. Ultimately, the improvement process may begin at any point in the organization, and that point is the top of the implementation effort by default. You should consider that you are the top of the effort. As the top person in the effort, you assume the responsibilities of establishing a constancy of purpose and visibly leading the improvement effort and demonstrating your commitment to it. You also have the responsibility of protecting the effort from negative signals to the greatest extent possible. Being the top of the effort will give you a great deal of latitude in determining the overall direction of your improvement effort. However, you should ensure that effort is consistent with whatever overall organizational goals have been independently communicated.

4. Cascade the Process Through the Organization

Once you have started your improvement process at this highest possible level, you should cascade it through the organization, layer by layer, to ensure complete and thorough adoption of the improvement philosophy. You do not need to complete implementation at one level to proceed to another, but you should ensure that key people are trained, goals have been determined, and improvement efforts have begun at one level before initiating the effort at the next level down. *Skipping levels is a crucial mistake because not only do you miss the opportunities for improvement at those levels, you risk alienating or threatening managers at those levels and turning them against your improvement effort.*

DEVELOP TEAMWORK

Teamwork is the engine that drives many improvement efforts. Creating teams allows you to apply diverse skills and experience to your processes and problem solving. They provide an underlying basis of experience and history for your improvement effort and are a vehicle through which you allow all individuals to participate in that effort. Not only must individuals cooperate within teams, the teams must cooperate together throughout the organization. An atmosphere of teamwork should permeate your organization, affecting not only formal team efforts but also each individual's interaction in the organization.

Often encouraging teamwork involves teaching people who already work together to consciously act as a team. These natural work groups exist as permanent teams whose objective is the continuous improvement of the processes they own.

> **"Solving a problem may be easier than you think. You need a systematic approach."**
>
> Dr. W. Edwards Deming

1. Facilitate Team Development and Activity

Teams will not just develop of their own accord. Often you will have to break down barriers between and inside organizations to enable team formation, and you will have to work to ensure those barriers do not reappear to interfere with team performance. Management approaches built on goal development independent of an overriding organizational vision and strategy create barriers because they permit conflicting and counterproductive goals. You must ensure that your teams develop goals and pursue improvements that reinforce one another as well as your organization's constancy of purpose. Teamwork in TQM is not merely "employee involvement," it is the management of participation.

Every process-improvement team should be working continuously to improve its processes; otherwise, the concept of continuous improvement does not work. You can help teams work continuously by encouraging them to work steadily on individual improvement efforts for fixed periods of time, and ensuring that when one effort is completed another begins. Each improvement effort may take on the appearance of a project when the systematic approach to improvement is used. Your goal, however, is to make this technique the way process maintenance and improvement is performed throughout your organization.

2. Guide Teams in Employing a Systematic Approach to Improvement

Using a defined, documented, systematic approach to improvement is a means of ensuring teams work consistently and methodically to effect improvement. You may apply any of many techniques here; some of these are described

later in the text and in the references listed at the end of the main text of this guide. Such approaches help a team develop improvement logically, document it, and present it to others so they may quickly understand it. These approaches also help ensure that teams maintain momentum in the improvement effort and do not run out of steam in an unguided process.

3. Create Cross-Functional Teams for Cross-Functional Purposes

Many of your organization's problems will not be confined to one functional group. You and your peers can cooperate in solving these problems by establishing cross-functional teams consisting of members from all affected groups. The cross-functional process should be identified and defined just as any other process, and it needs an owner as well. Cross-functional teams use the same operating principles and should employ the same systematic approaches to their improvement efforts as other teams. You must work to ensure the cross-functional teams rise above parochial issues and concentrate on the common processes the teams were created to address.

4. Create Special Teams for Special Issues

Emergent problems within your organization will demand immediate attention. Although they are short term and take on a problem-solving instead of a continuous-improvement nature, special efforts are every bit as important as ongoing processes and long-term problems. One way of dealing with emergent issues is to create special teams that come into being to deal with selected issues and then are disbanded upon their resolution. Special teams should use the same systematic approach in dealing with their problems.

5. Work Toward Everyone Becoming Part of an Improvement Team

Individual improvement contributions are important, but it is through team effort in the formal process-improvement cycle that individual contributions become "synergized" and larger improvements take place. You should strive eventually to make each individual in your organization part of at least one improvement team – their natural work groups. Each employee will have something to contribute. Team participation creates an atmosphere of camaraderie. Individuals in a team learn to count on and trust other team members and thus become more effective in their own jobs. Optimal team size depends on the extent of the process involved. If you are concerned that your teams are too large, create more teams so that everyone may participate. Many good ideas come from your workers because they are the closest to the processes where work actually gets done. You must create opportunities for them to participate.

6. Support and Reinforce Team Behavior and Performance

You will need to demonstrate your expectations of team behavior if you are to get maximum performance from your teams. You can do that by verbally reinforcing the need to use team operating techniques and by supporting actions that emphasize team behavior. Every member of a team should be active and participate in the effort. Your encouragement, evaluation, and feedback of a team's activities should stress its team-related behavior and performance. Remember that teams depend on management participation and commitment for success.

7. Recognize Effort and Approach, Not Just Results

Some improvement efforts will not yield the expected results. In some instances the principal outcome will be a deeper knowledge of the process instead of immediate measurable performance improvement. Recognize your teams for their adherence to the desired approach and to team behavior in addition to recognizing them for results they achieve. In general, if the teams adhere to the philosophy and approach of continuous improvement, they will ultimately improve their processes. That is the only way you will ensure that continuous improvement becomes a part of the way you and your organization do business every day.

8. Ensure That Process-Improvement Teams Are Linked Vertically and Horizontally

Linking teams vertically ensures that lower level teams will work consistently with the expectations of higher level teams, and, as a whole, the organization will proceed consistently. Linking teams horizontally ensures that common problems are addressed by joint groups and that lessons learned in one area may be applied to other areas without duplicated effort. You can link teams vertically by ensuring that the leader of one team is a member of a team at the next highest level. Horizontal linking is accomplished through your participation or participation by your subordinates on cross-functional and special improvement teams.

PROVIDE SUPPORT, TRAINING, AND EDUCATION

If you expect to implement TQM yourself and expect your subordinates to follow suit, you must ensure adequate time and training resources are available to support your effort. TQM does not depend on additional people or money; rather, it relies on the availability of time for individuals and groups to pursue improvement efforts and on the availability of training and education to develop needed skills and experience in improvement techniques and tools. You must make those time and training resources available for yourself and your people; doing so is one way for you to demonstrate your commitment to the improvement effort.

While awareness is the way you get your TQM effort moving, education and training help accelerate it dramatically. Provided in the right place at the right time, they allow you to develop needed skills both in yourself and in your subordinates. They help develop experience in the techniques necessary to implement TQM. That experience is the first step to making TQM a part of your day-to-day work life. And, of course, technical training and education are essential to improving each employee's specific job skills. Education and training are comprehensive, intensive, and unending. Quality improvement efforts begin and continue with education and training.

> **"This is not an effort that requires a massive infusion of capital. This is an effort that requires a massive amount of thinking."**
>
> Richard Goodrum

1. Make Improvement a High-Priority Activity

When you believe continuous improvement is important to your organization's future, you will demonstrate that belief by giving improvement activities the priority they need to be effective. That demonstration includes providing training and ensuring improvement teams have the time to meet regularly, necessary documentation is prepared and maintained, and emergent events do not routinely disrupt improvement activities. How you respond to the performance of your subordinates will directly reflect your belief in the importance of continuous improvement; you must ensure they are recognized for their improvement efforts. That recognition is key to success; recognizing those who sincerely do TQM can motivate others to join the effort.

2. Create Time for Your People To Address Improvement

If you expect your people to pursue the continuous improvement process, you must provide them time for those efforts. They must be able to attend group meetings and perform independent activities such as data collection and analysis. Do not require them to provide time for improvement at their own expense. Improvement activities are important enough that you should set aside time for them on a regular basis. Suggestion systems should be part of the daily work practices, not something employees do in their spare time. Allowing your people to devote time to improvement will make their use of time overall more effective and efficient. You must also provide time for your people to be trained, both on the job and in the classroom, because continuous improvement of their knowledge and capabilities is an essential element of TQM. Once people begin to see positive change, many will contribute additional effort voluntarily. As non-value-added tasks are eliminated through process improvement, more time will be made available for your improvement effort.

3. Organize To Support Improvement

Organizing your people to support improvement efforts will help you more easily provide necessary resources. If your organization's natural work groups mirror your improvement efforts, group meetings will be easier to arrange and will fit more naturally in the context of job responsibilities. You may need to set up some supporting team structures to work on broad issues or problems. By having groups follow a consistent process-improvement methodology, you will eventually establish an approach to work that includes the time necessary for improvement activities and individual and group training.

4. Educate Everyone Consistently

Your improvement effort requires that you provide every person in your organization a consistent, common level of knowledge about TQM principles, practices, skills, and techniques. You must structure your education and training program to provide the basic knowledge necessary for your effort and provide that knowledge consistently across the board. Developing such a program means that you yourself must first become educated in TQM.

5. Make Full Use of Available Resources

Training is a valuable resource but it can be a costly one. Developing tailor-made training approaches is very effective but can be time-consuming and expensive. To reduce the costs of your education and training, you should use readily available training materials where appropriate. They include books, video tapes, classroom instruction, consultant services, and in-house TQM expertise. Chances are that many of your training needs can be satisfied by these off-the-shelf materials; once you have evaluated what is available and its usefulness, you should supplement your training needs with specially designed materials and programs as needed.

6. Provide Training and Education Resources

Without training and education you and your subordinates cannot grow in knowledge of the improvement process, you cannot improve your capability, and you cannot increase your ability to improve. As a leader you are responsible for promoting both the professional and personal development of your people. This includes making training available to all your subordinates, both individually and in groups, and seeing to it that they receive that training when they will have immediate opportunities to use it. You should encourage independent training and education. You must also ensure

that you and others in your organization provide timely on-the-job training directly aimed at improving an individual's specific skills.

The job itself can be an extremely valuable training setting. On-the-job training provides the trainees an immediate opportunity to use their new skills in an environment that is directly relevant for them. You must have profound TQM knowledge before training your subordinates on the job, but through on-the-job training you can instruct your subordinates in the most necessary skills without waiting for available training courses. You should train on the job every day, in either formal planned situations or informal spontaneous ones. On-the-job training should address specific job skills as well as improvement techniques. On-the-job training is the responsibility of every supervisor, manager, and leader.

If you train or educate yourself or someone else in any subject, but do not give yourself or the trainee a chance to use the new knowledge, the training ultimately goes to waste. Mass training approaches can be particularly wasteful in this regard. You should train yourself and others when an immediate opportunity is available to apply that training to improvement activities. Training is continuous; it must be performed throughout the life of a continuous-improvement effort.

7. Train the Managers and Supervisors

Managers and supervisors are the most important sources of training for their subordinates. Just as you are the focal point of your own improvement effort, managers and supervisors are the focal points for their own organizations. If they are to ensure their subordinates are well trained, they must be well trained themselves; without adequate, appropriate training they will also be unfamiliar with the principles, skills, and techniques essential to the improvement effort.

BUILD TRUST AND RESPECT

Employees who trust their managers and who are trusted and respected in turn can provide the edge that organizations need to provide superior services or products. Workers have the best, most up-to-date knowledge about how well processes are working, what problems have arisen, and how things could be better. If their opinions are respected, they will share their knowledge and creativity with management – the only way to ensure continuous improvement.

Trust and respect are essential for individual participation. Without such an atmosphere, people will not take actions or make recommendations they perceive to be risky to themselves. TQM is a process that depends on every person being unafraid to take chances and unworried about risking his/her self-esteem. You must be open and honest with your people and establish channels of communication that are reliable and accessible to everyone in the organization. If people broach ideas, they should be praised; if they identify problems in the process or system, they should be thanked; when they contribute, they should be recognized; when they fail, they should be supported; and when they succeed, they should be rewarded. As their leader, you are responsible for creating an atmosphere of trust and support, and you are responsible for maintaining each individual's sense of self-worth and self-esteem.

> **"People are not an asset, not a resource. They are a treasure to be protected."**
>
> Dr. W. Edwards Deming

1. Recognize That People Are Your Most Important Treasure

People are the most important treasure your organization has; they are more than a mere resource. Do not treat them as expendable. They are your experience, your knowledge base, your corporate memory, and the spirit of your organization. In times of hardship try every other alternative before you make personnel cuts; people are the only element you cannot easily replace. In addition to being the lifeblood of your organization, people also fuel your continuous-improvement effort. Every action you take must recognize their importance, and must avoid treating people as subordinate to the system. Work to remove the factors that demotivate people.

2. Value and Encourage Individual Contributions

Recognition is an essential human need. Every person's sense of self-worth must

periodically be confirmed, and as a leader, you are responsible for that confirmation. Recognizing specific individual contributions to the organization or to the improvement effort is the most obvious way of acknowledging an individual's value. You may reassure people in other ways as well. Taking an active interest in their day-to-day activities shows you care not only about their performance but about them as individuals. When you take the time to ensure each person gets essential, supplementary, and continuing training and education, you are recognizing their value. Finally, prompt action on their suggestions shows people that you value their ideas and their contributions to organizational improvement.

Individual efforts can substantially contribute to the continuous improvement effort even if undertaken outside the context of team activities. Because individuals work in the process every day, you must depend on them to identify problems with their processes or opportunities for improving those processes. You should ensure management support for individual improvements, recognizing individuals who make substantive contributions. By making it easy to quickly implement individual improvement requests and personally interesting yourself in the results, you will greatly increase your subordinates' willingness to suggest improvements both individually and as part of their teams.

3. Recognize That Everyone Has a Responsibility for Quality

People will contribute most when they are responsible for something. When you recognize that quality is the responsibility of every individual every day, it becomes easy to accept the importance of providing the resources necessary for continuous improvement. Without the time and training necessary to support them, improvement efforts will wither and die. All individuals must have the resources they need to fulfill their responsibility for the quality of their processes. By providing the necessary resources, you enable the organization to realize the vision of total quality responsibility.

4. Listen for Even the Smallest Voice

Every individual has the potential to contribute to your improvement effort. People are often shy and reluctant to contribute in a group setting, but that reluctance can be maintained individually as well. You have the responsibility to encourage each individual to contribute. Systematic brainstorming techniques can help encourage individual contributions By recognizing each contribution, no matter how small, by praising ideas publicly, and by consulting every individual as appropriate, you will develop a climate in which people are increasingly willing to participate actively in the improvement effort. Even if the ideas you elicit are relatively small, you should keep up your enthusiasm and your support; you never know when a terrific idea will spring from the mind of the most unlikely individual.

CREATE AN ENVIRONMENT IN WHICH CONTINUOUS IMPROVEMENT IS A WAY OF LIFE

By making continuous improvement a part of your daily routine, you will integrate it into all aspects of your work. Continuous improvement only approaches maturity when it is applied routinely to all of your organization's work. Routine application entails using the process-improvement cycle in all areas, collecting data and using those data to assess process suitability, removing roadblocks to your improvement efforts and those of others, and continuously improving your knowledge and expertise in process improvement. Ideally, continuous improvement should be your normal approach to doing your work; it must become your way of life.

> **"Don't bother just to be better than your contemporaries or predecessors. Try to be better than yourself."**
>
> William Faulkner

1. Expect Improvement

If continuous improvement is your way of life, you should expect improvement routinely from yourself, your subordinates, your peers, and your superiors. Expecting improvement does not mean you punish when improvement does not occur, but rather that you are unwilling to accept the status quo. In a continuous improvement environment you deliberately seek positive change as the means of engendering improved performance. You continually ask questions. You measure to assess degrees of change and suitability. You must constantly demonstrate through your own actions and words that you are never satisfied with anything less than continuous improvement. You must not express this negatively, but use the drive for improvement to provide constant incentive to your subordinates and constant recognition for improvements attained.

2. View Problems as Opportunities

Problems are your only chance to improve your processes; without problems there is no incentive for improvement. Many individuals tend to see problems negatively or as indications of failure. You should instead look at emergent or long-term problems as the site of your next improvement effort. Your problems are a gold mine of potential personnel, dollar, or time savings. They signal opportunity for better products or services created with less effort. Acknowledging problems and rewarding those who bring problems to light is an essential part of the continuous improvement effort.

3. Constantly Examine the Value of Policies, Practices, and Procedures

Throughout your organization you will find policies, practices, and procedures that

contradict TQM goals and desired behavior. You must identify those contradictions, examine their value, and modify them if your TQM effort is to be successful. This is a continuous effort because new policies and practices are always coming into being and not all will be consistent with TQM. Eliminate those elements that add no value or demoralize and demotivate individuals in the organization. Eliminate waste, both material and financial waste and wasted time.

4. Drive Out the Sources of Fear

Fear causes resistance to change, and fear of your improvement effort will force you to spend great amounts of effort that might have been used more productively in actual improvement activities. One main source of fear is the "shoot the messenger" tendency in many organizations. Don't blame individuals who report problems; those problems are opportunities for improvement that you would not otherwise have discovered. Likewise do not penalize the individual reporting the problem by making its solution his responsibility unless he owns the process that has the problem. Another common individual and group fear is that of survival in a new environment. *You must take pains to reassure individuals and groups that they will not eliminate their positions through their own improvement efforts; although their jobs may change, they will continue to have jobs within your organization.*

5. Recognize Success and Share the Credit

Recognizing success is another way to reduce fear and to encourage individual and group improvement activity. Recognition is a fundamental human need, and celebration of success is a fun way to provide that recognition in a nonthreatening, noncompetitive environment. Be sure that in your celebrations you give credit to all groups and individuals who contribute to success and minimize your own importance. Frequent celebration will demonstrate your interest in all your organization's improvement efforts, and will help engender feelings of good will associated with the improvement process as a whole. Make the workplace enjoyable.

6. Assess Improvements Based on Data, Not Intuition

Total Quality Management is about measurement; measurement to assess the need for process improvement, measurement to localize symptoms, measurement to verify causes, and measurement to evaluate changes. You cannot reliably determine the course or the success of your improvement effort without collecting and using data effectively. Intuition is valuable in interpreting data and determining future courses of action, but the data themselves validate your improvement methodology and practices. Don't just think something is better – verify it with data. An experiment is better than an argument.

7. Encourage Innovative Thinking and New Ideas

In the spirit of continuous improvement and positive change, you must ensure your organization is receptive to new ways of doing things. Your workers are the richest source of improvement ideas in your organization. By implementing or revitalizing suggestion systems and acting promptly on suggestions, you will reinforce the importance of everyone's participation. Small, incremental improvement ideas are usually easy to implement; you should approve and encourage them wherever possible and act to ensure their quick implementation and testing. Use intrinsic rewards such as praise and pride of workmanship in preference to extrinsic rewards such as money. Often your prompt action on employee suggestions will be much more meaningful than trivial tangible rewards. Group awards will also foster teamwork.

8. Align the Reward and Recognition Systems with the TQM Philosophy

Reward and recognition systems must be consistent with the behavior and attitudes you wish to develop in your people. Continuous improvement should provide continuing team opportunities along with individual opportunity for improvement and achievement. Constantly recognize and reward your people as appropriate. Reinforce group behavior instead of rewarding individual behavior that will make one person look good *at the expense of others*. Individual leaders should have more authority to recognize and reward their people and groups as appropriate without having to rely on a bureaucratic centralized system.

9. Cease Reliance on Mass Inspection

Mass inspection is an extremely expensive and unreliable method of ensuring quality. Merely inspecting products and discarding or reworking unacceptable items does nothing to fix the underlying process problems that cause product deficiencies. You will have more reliable quality when you emphasize process control and improvement over inspection. This means shifting your focus gradually over the course of your improvement effort until inspection becomes only a means of developing indicators of process adequacy. Mass inspection is a product-oriented approach to quality; process-oriented approaches are much more effective and are the fundamental underpinning of TQM.

10. Employ Meaningful Measurement Systems

You should measure data that are meaningful and provide you information with which you may improve processes. To do so, you have to measure what is important and not merely what is easy or readily available. You must measure and evaluate all improvement opportunities. To the extent possible, measurement should be used in treating causes instead of symptoms. If you go to the trouble of creating meaningful measurement systems, use them. Measurement is fundamental to knowledgeable process improvement; you cannot reasonably expect to know how well your process is functioning or how effective your improvements are if you cannot reliably measure your process. Make decisions based on data.

11. Cost-Justify Intelligently

Proposed improvements may not always be justified purely on the basis of their projected financial savings, but they may bring intangible benefits that could far outweigh their immediate monetary costs. You should exercise good judgment on what makes sense. Often, large downstream benefits may accrue from an upstream improvement. You should examine a potential improvement for the tangible and the intangible benefits it will provide in terms of a better workplace, more-satisfied people, or higher quality. Often true cost and savings figures may be unknown and unknowable; improvements should be implemented with the continuous improvement philosophy always in mind.

CONTINUOUSLY IMPROVE ALL PROCESSES

Continuous process improvement, as the basis of TQM, is a never-ending effort. Perfection is an ultimate, unattainable goal, but its ideal is the basis for continuous improvement efforts. You must view everything your organization does in terms of interrelated processes. Process improvement should become your organization's way of life. Goals and objectives are realized through process improvement. Your own focus should be to improve all the processes you own and remove all those barriers under your control that hinder others from improving their own processes. The only true measure of your performance over time is the degree of process improvement you effect.

Process standardization is a means of defining a process and ensuring that everyone understands and employs it in a consistent manner. It is difficult to improve upon something that is not well defined. Process standards communicate the current best-known way of performing a process and ensure consistent process performance by a variety of individuals. With a standard, people have a way to know that they are doing their jobs correctly and you have a means of assessing their performance objectively. Process standards provide the baseline from which to continuously improve the process. The people doing the work should maintain and update standards as they improve their processes so that the standards always reflect the current best-known means of doing the work.

> **"Statistics is the language that allows the work to talk to us – it tells us when to make a change or when to leave it alone."**
>
> Louis E. Schultz

1. Understand That Everything Involves a Process

Total Quality Management focuses on process improvement, so everything your organization does should be described in terms of a process. Simply defined, a process is a transformation of inputs into outputs. Inputs may be materials, money, information, opinions, needs, or anything else a process uses in its transformation. Outputs are products, services, and information. Processes are bounded activities that may be described. They are often repetitive. You should evaluate your function in your organization by identifying the processes you own.

2. Develop Process Ownership

Only a process's owner truly has the power to improve that process. For that reason you must clearly identify the processes you own and those in which you participate but are owned by others. A process owner has both the responsibility for a process's correct functioning and the authority to change that process. The process owner has a stake in how well the process functions. It may be an individual or a team. If you as an individual own a process, it will most likely be beneficial to establish a related process-improvement team or use an existing work group as a team. As the process owner, you should have as much latitude to change the process as necessary for it to function optimally. That authority will enable you to establish a systematic improvement approach.

3. Ensure That Every Team Owns Its Process

Just as you must have the authority and ownership over the processes for which you are responsible, you must give teams under your leadership the ownership over their processes. They must have a stake in how well the processes work, the responsibility for correct process functioning, and the authority to change their processes where necessary. Without process ownership team improvement efforts risk being ineffective because of the threat of external reversal of their efforts or because of a disinterest in the effort as a whole.

4. Carefully Define Your Processes

Process definition is an essential prerequisite to process improvement. You cannot improve what you cannot define. Process definition begins by defining the customer, whether that customer is internal or external to your organization. If your process has no customer, that process is unnecessary. In addition to defining your customer, you must also define your inputs and outputs and how to measure them. Make sure you include both tangible and intangible elements. Finally, you must set down your process in writing, the most common techniques being flow charts or flow diagrams. Until you can set your process down on paper, you do not really understand what that process is or how to measure it.

5. Study Process Variation

A concept that is key to understanding the principles of TQM is *variation* and its effects on how we judge process performance and process capability. Variation is present in every process all the time; what we put into our processes – be it information or raw materials – varies from day to day, as does what we get out of them. Luckily, simple tools are available for understanding, measuring, and reducing variation. The goal is to reduce sources of variation as much as possible so processes become more stable and more predictable. Until you reduce variation in a process, you will be unable to assess the impact of other improvements you make.

6. Bring Processes Under Control

When you know how to identify and track variation, you will know how to distinguish between *special* (assignable) and *common (inherent) causes of variation*. Work to identify the special causes such as poor training or power surges that are not endemic to the process itself. You should also identify common causes that are variations within the process such as machine error or material variability. Once you identify the causes of variability, you should work to remove them and reduce the variability.

As you eliminate special causes of variation, the performance of a process will become stable. Variation will still arise from common causes, but you will be able to predict within a known range ("control limits") how much variation you can expect in the output of

the process. Such a process is said to be "in statistical control."

7. Standardize and Improve on Current Best-Known Methods

Your process must be clearly described and readily understood by all individuals who will participate in it. Make standards readily available for reference by the people who will participate in the process. The process standard should be developed by its participants. You should encourage them to follow the current standard and to improve the process both through group improvement activities and individual initiatives. Process standards should allow for easy and frequent process improvements.

Process standards are worthless if they are not current and up-to-date. Processes should be continually improved, and you must keep pace by updating process standards correspondingly. Maintaining process standards is vital to ensuring that jobs are being done the best-known way and ensuring that people are implementing the results of their improvement efforts. Groups and individuals should formally incorporate all process improvements in the written process standards as those improvements are proven and implemented. Make the new standards available to everyone as soon as possible so all may begin to benefit from the latest improvements. Ensure processes that are improved as the result of individual improvement efforts have their standards updated just as quickly and formally as those of processes improved by team efforts.

8. Assess Process Capability

Once you have a stable process in statistical control and have all operators of that process using standard procedures, you will be able to assess the capability of the process *as it is currently structured.* If your desired performance levels are different from those seen in the stable process, then you must look toward *innovation* or *fundamental changes* in the process structure to achieve new performance levels.

9. Remove Complexity: Simplify, Consolidate, Eliminate

Before making major changes in the ways you do things, you should try to simplify and consolidate your processes as much as possible and eliminate unnecessary steps or processes. Great savings may be realized by eliminating wasteful effort, and the result is processes that are more productive, efficient, timely, and that better meet their customers' needs. During your process definition effort you will discover many places your processes may be streamlined; subsequent process improvement efforts should initially focus on identifying further simplifications. Only after your processes are completely streamlined should you consider major investments in automation and equipment.

10. Encourage Small Incremental Improvements

Incremental improvements are the real strength of the improvement effort. While innovation usually provides the potential for great leaps in capability, its opportunities are relatively rare and infrequent. Incremental improvements to existing processes and capabilities are the way you achieve continuous improvement. You ensure that improvement is measurable and definite to the extent possible. Your expectations should be framed not in terms of giant steps forward but moderate, deliberate increments of improvement. The sum of the incremental improvements you achieve, both through individual and group activity, will be equally as impressive as those gains achieved through innovation.

EXPAND CULTURE TO SUPPLIERS

Your organization's ability to improve its processes depends in part on the inputs to those processes. To the extent that you procure materials and services from other organizations, your continuous improvement effort depends on those suppliers. Expanding your improvement culture to all your suppliers will help ensure that the quality of your process inputs is sufficient to meet your own improvement objectives. You can expand your culture of continuous improvement by working more closely with your suppliers, helping them get their own improvement efforts underway, removing roadblocks to an effective acquisition process, building mutual trust and respect, and generally by becoming a better customer yourself. While some of the accepted practices described here may appear to contradict current legislation and Government practice, you should nevertheless investigate them to determine how you might take best advantage of them within the existing system.

> **"When you starve with a tiger, the tiger starves last."**
>
> Walt Kelley

1. Simplify the Acquisition Process

A complicated, bureaucratic acquisition process irritates your suppliers and discourages their participation in your work. It can hide inefficiencies in the overall supply process and is likely to hinder timely procurement of the appropriate materials and services. By examining your acquisition process and eliminating unnecessary or duplicative requirements and procedures, you will be able to procure needed inputs much more effectively and efficiently. Applying TQM to procurement processes is one logical means of simplifying them; the process improvement cycle will identify and address areas needing improvement. The resulting improved process will benefit both you and your suppliers.

2. Involve Suppliers Early

Total Quality Management is a lengthy process requiring years to reach maturity. If you wait for your own effort to become mature before involving your suppliers, it may be twice as long before you see improvements in your purchased materials and services. Involving your suppliers early will help you reap maximum benefit from your improvement effort and theirs as soon as possible. Additionally, involving suppliers early will enable each of you to take advantage of lessons learned by the other at times when they will be useful to you both.

3. Engage Suppliers in Mutual Problem-Solving

If you can encourage your suppliers to participate in solving problems affecting you both, you will benefit from the perspective of both parties. Forming joint customer/supplier teams to work on mutual problems is one means of addressing these problems. Such teams are particularly appropriate since the customer and the supplier are joint owners of many of the acquisition processes. These joint teams must work to achieve mutually agreed-upon objectives with the overall goal of improving the way their business is conducted.

4. Help Suppliers Improve

You can best increase the quality of your procured materials and services if you assist your suppliers in improving their own processes. You may do so by holding supplier TQM seminars, allowing suppliers to attend your own classes or training sessions, instituting personnel exchange programs, and providing quantitative data to suppliers on their performance. These activities must take place in an unrestricted atmosphere if they are to have substantial effect. You must treat your suppliers as though they are part of your own organization, for in effect they are as important a part as you or your subordinates.

5. Reward Improving Suppliers Appropriately

Recognizing improvement is important to individuals and groups within your organization, and it means a great deal to your suppliers as well. You may reward suppliers that demonstrate improvement with reduced oversight of their processes, additional contract awards, pricing or performance preferences, or increased contract profit levels, depending on your organization's acquisition policies and regulations. Resultant reduced inspection of supplier products is a mutual benefit for you and your suppliers. Suppliers must know that their efforts to improve are recognized, that you believe those efforts are important, and that you are willing to demonstrate your belief.

6. If Possible, Minimize the Number of Suppliers

The increased amount of attention you devote to your suppliers in a TQM environment implies that ideally you should embark on closer, longer term partnerships with fewer suppliers. To the extent that such relationships are possible in your organization, you should restrict your business dealings to only those suppliers with demonstrated TQM enthusiasm and growing capability. You should notify your existing suppliers of your intent and give them the chance to institute their own TQM efforts, but ultimately your improvement objectives will not be attainable unless all your suppliers subscribe to the set of beliefs and practices to which you subscribe.

7. Go with the Few Best and Improvement-Oriented Suppliers

Distinguishing among suppliers may be difficult at first. By using an objective set of criteria to evaluate your suppliers, you will find it easier to determine the suppliers with whom you will be able to develop the best long-term relationships. Key things to look for in a supplier mirror the significant elements of your own improvement effort: a vision of continuous process improvement, leadership by top management, a focus on teamwork, and an emphasis on data-driven improvement. If you identify the significant elements of your improvement effort, you will also identify those elements you will find important in your suppliers' efforts.

8. Listen to Suppliers

Being the best customer you can be means you must listen to your suppliers' requirements for clear, concise identification of your needs, requirements, and expectations. Your suppliers cannot provide you the materials and services you require unless your requirements are clearly and explicitly stated. Define clearly what you are talking about. You must ascertain that your suppliers understand what you are saying, and that they are capable of meeting your needs. Listening to your suppliers will also ensure that you are up to date on the status of their own improvement efforts. Because your needs and requirements are never static, listening is an ongoing effort.

9. Remove Roadblocks and Barriers Instead of Creating Them

As with other areas of TQM, one of the most effective things you can do as a customer is remove roadblocks and barriers to effective acquisition processes. In addition to streamlining the processes, you should continually evaluate your acquisition efforts to determine rough spots and roadblocks, especially those you create yourself. Those that you identify or are identified to you by your suppliers should be promptly and effectively removed. Don't just streamline processes to reduce the time required; ensure you are removing only true barriers and non-value-added effort. By applying TQM to your acquisition process and by listening to your suppliers, you will identify and remove most of the existing and emergent barriers.

10. Work to Build Mutual Trust and Respect

Developing a long-term partnership depends on establishing an atmosphere of mutual trust and respect. Without that trust your efforts to help suppliers develop their own TQM efforts will not be fully accepted; neither will you unconditionally accept your suppliers' improvement results. By approaching business negotiations in an open manner, by establishing joint problem-solving efforts, and by offering to share your improvement expertise with your suppliers, you will create a great deal of good will that will provide a foundation for the desired atmosphere of mutual trust and respect.

CHAPTER 3

A GENERAL MODEL FOR IMPROVEMENT

As representations of something existing or planned, models provide useful examples upon which to pattern behavior or activity. The value of a model lies in its unique power to communicate the essential aspects of its subject. Experts in the field have produced a variety of models to aid in starting and sustaining improvement efforts. Such a model allows you to discuss an improvement effort or approach with others and relate the philosophy and principles that you contemplate for the organization to specific situations. By using a model you may more easily troubleshoot your TQM approach and more effectively plan your implementation. Since each organization and situation is unique, however, no single model is appropriate for every effort. Each organization must ultimately craft its own approach to improvement based on its own specific needs and imperatives.

In this chapter we provide a general model for continuous improvement, a model that creates a logical context for implementing the strategy described in Chapter 2. While your organization must ultimately define its own model, the model described here offers a starting place. It is divided into three general categories: (1) organizational transformation, (2) process improvement, and (3) individual improvement. Appendix A presents brief descriptions of some representative models used by experts in the continuous improvement field; those descriptions should give you some indication of how various people have approached constructing a model.

ORGANIZATIONAL TRANSFORMATION MODELS

Organizational transformation addresses how to lay the groundwork for instilling and sustaining a culture of continuous improvement. In considering organizational transformation, you are concerned with many issues including the following ones:

- Establishing a vision of where the organization wants to go and articulating a mission statement
- Building organizational awareness of the need for change and the benefits of improvement efforts such as TQM
- Establishing leadership of the improvement effort
- Removing barriers and other demotivating factors
- Creating supportive environmental systems
- Structuring the improvement within your organization
- Creating a constancy of purpose throughout the organization
- Encouraging and empowering individual and group participation
- Developing and promulgating a standard approach to process improvement
- Enabling team formation and activities
- Providing extensive and comprehensive education and training for every individual in your organization.

The transformation model should also encompass your models for process improvement and individual improvement, as explained later in this chapter.

You can approach organizational transformation in a number of ways. You can use specific step-by-step approaches that rather rigidly prescribe activities and initiatives, or you can take general activity management approaches in which you focus on streams of activity that continue throughout the life of your improvement effort. We can, however, cite the following broad activities that you should address in your organizational transformation effort:

- Envisioning your organization's mission, goals, and objectives
- Enabling the achievement of that vision
- Focusing improvement efforts on achieving the vision
- Actually improving processes and functions
- Building teams to support your improvement effort
- Educating and training people in your organization as necessary.

Table 3-1 presents a summary of the elements that may be included within those activities. As a rule, most successful improvement efforts in the public and private sectors apply the majority of these elements in their models and approaches to continuous improvement. The better you are able to combine these elements in your specific situation, the more likely your chances of success.

TABLE 3-1

ORGANIZATIONAL TRANSFORMATION MODEL ELEMENTS

Envision and enable

- Recognize the need to change
- Use outside consultants to start
- Develop internal facilitators
- Form a steering committee
- Educate members in TQM philosophy
- Establish a vision for the organization
- Develop a business strategy
- Prepare a mission statement
- Prepare a TQM information package
- Make a long-term commitment
- Demonstrate top-management commitment
- Make "time for improvement" a policy
- Conduct an internal assessment
- Relate TQM principles to the organization
- Examine policies and practices
- Examine communication processes
- Open communication channels
- Remove obvious barriers to improvement
- Eliminate systemic sources of fear
- Create a conducive environment
- Examine and improve support systems
- Align reward and recognition with TQM
- Conduct an external assessment
- Establish a customer focus
- Understand customer needs and expectations
- Encourage individual effort
- Establish an effective suggestion system
- Stimulate creative thinking
- Empower individuals to make a difference
- Enable individual improvements (see "Individual-Improvement Model")

TABLE 3-1

ORGANIZATIONAL TRANSFORMATION MODEL ELEMENTS (Continued)

Focus
Develop an improvement plan
Establish goals and objectives
Develop a top-level measurement system
Inform and involve everyone
Disseminate an information package to everyone
Discuss TQM throughout the organization
Deploy goals and objectives into the organization
Involve customers and suppliers
Learn
Define learning needs
Develop learning systems
Determine learning methods
Obtain materials
Train and educate just in time
Train on the job
Let supervisors train subordinates
Provide staff support
Make training and education a high priority
Recognize and reward learning achievement
Team build
Cultivate leadership
Choose and develop champions
Select team members
Establish the purpose for teams
Form teams
Create cross-functional teams
Create special teams
Train teams
Designate team leaders
Link champions with teams
Remove team obstacles
Form process-improvement teams
Train improvement teams

TABLE 3-1

ORGANIZATIONAL TRANSFORMATION MODEL ELEMENTS (Continued)

Team build (Continued)
- Use improvement projects
- Integrate natural work-group teams
- Recognize and reward TQM behavior
- Support continuous improvement

Improve
- Employ a disciplined methodology (see "Process-Improvement Model")
- Initiate improvement cycle activity
- Develop process/team measurement systems
- Define and standardize processes
- Gain control of processes
- Simplify processes
- Improve processes
- Eliminate non-value-added activity
- Make processes foolproof
- Focus on upstream processes
- Apply simultaneous engineering concepts
- Apply robust design development concepts
- Focus on system inputs
- Apply just-in-time concepts
- Focus on organizational systems
- Apply cellular processing concepts
- Apply leadtime reduction concepts
- Focus on system outputs
- Apply inventory reduction concepts
- Focus on downstream processes
- Apply timely feedback concepts

Evaluate
- Measure organizational performance
- Assess and analyze data
- Evaluate improvement results
- Assess progress
- Recycle improvement efforts

PROCESS-IMPROVEMENT MODELS

Process-improvement models are essential elements of any improvement effort. By improving processes, you ultimately improve the overall quality of your organization's products and services. Although certain specific techniques will be more appropriate for some organizational elements than others at a given time, you should approach process improvement consistently throughout your organization. An inconsistent approach will lead to communication failures, inability to coordinate improvement efforts throughout the organization, and a general lack of agreement on how to structure the cross-functional improvement efforts essential to the total organizational effort.

A process-improvement model provides you a structure within which to perform individual process-improvement efforts. Process improvement is a cyclic, never-ending activity. Consistent with an organizational culture of continuous improvement, a completed process-improvement effort is followed by another improvement effort, and another and another as the organization continually improves its effectiveness and reacts to changing external and internal conditions. The process-improvement model provides you a plan for identifying and defining your processes, identifying improvement opportunities, implementing and evaluating improvement efforts, and determining the next area for improvement.

Most process-improvement models are based on the classic Shewhart/Deming *Plan-Do-Check-Act* (PDCA) cycle (the examples in Appendix A are consistent in this regard) wherein you routinely and cyclically pursue process improvements and evaluate those improvements based on hard statistical data that you collect. A variety of tools are available to support the process-improvement effort, including the all-important seven basic graphic tools discussed briefly in Appendix B. The process-improvement models are integrated into organizational transformation models in some cases, but process improvement is ultimately where "the rubber meets the road." Table 3-2 provides you a list of elements common among most process-improvement models. Again, you will have to structure your own model in a way that makes sense given the context of your organization, but the elements in Table 3-2 and the examples in Appendix A will give you a place to start.

TABLE 3-2

PROCESS-IMPROVEMENT MODEL ELEMENTS

- **Set the stage for process improvement**
  - Create the environment
  - Select the improvement team
  - Train the improvement team
  - Educate about improvement tools
  - Discuss mission statement
  - Discuss quality issues
  - Set ground rules and determine logistics
- **Select a process to improve**
  - Identify opportunities
  - Set priorities and select opportunities
  - Localize the problem
  - Create an improvement plan
  - Establish operational definitions
  - Establish team objectives
- **Define the process**
  - Describe the process or problem
  - Flow chart the process
  - Identify supplier/customer relationship
  - Identify key measures of performance
  - Relate measures to customer needs and expectations
  - Ensure capable measurement system
- **Standardize the process (SDCA)**
  - Standardize
    - Standardize procedures
    - Assess process stability
    - Reduce variation in measure system
    - Assure controlled measure system
    - Analyze special causes of variation
    - Correct special causes
    - Bring process under control
    - Document the standard

Note: SDCA = *Standardize-Do-Check-Act*.

TABLE 3-2

PROCESS-IMPROVEMENT MODEL ELEMENTS (Continued)

- **Standardize the process (SDCA) (Continued)**
  - Standardize (continued)
    - Communicate the standard
    - Promote the standard
  - Do
    - Train to the standard
    - Enable the standard
    - Enforce the standard
  - Check
    - Measure results to the standard
    - Respond to deviation from the standard
    - Identify root causes of variation
    - Analyze common causes of variation
  - Act
    - Reduce variation in process
    - Prevent recurrent deviation from standard
    - Document standarc' improvements
    - Revise the standard
- **Tighten the process**
  - Assess process capability against requirements
  - Streamline the process
  - Error-proof the process
  - Straighten up the work area
  - Eliminate unnecessary equipment
  - Institute total productive maintenance
  - Document lessons learned
  - Collect and maintain process performance data
- **Improve the process (PDCA)**
  - Plan
    - Develop questions
    - Develop a theory
    - Analyze available process data
    - State a goal

Note: SDCA = *Standardize-Do-Check-Act*

TABLE 3-2

PROCESS-IMPROVEMENT MODEL ELEMENTS (Continued)

Improve the process (PDCA) (Continued)

Plan (Continued)

- Plan a change or test
- Design system changes
- Define expected outcomes
- Identify process measures
- Plan data collection strategy
- Establish a test measurement process
- Test and refine data collection

Do

- Train to the plan
- Enable the plan
- Conduct cause-and-effect analyses
- Carry out the change or test
- Follow the plan
- Experiment with process changes

Check

- Observe/collect the data
- Analyze the data
- Look for pattern in the data
- Compare the data with theory
- Respond to deviations from the plan
- Identify root causes
- Determine the type of cause
- Correct special causes immediately
- Look for alternative solutions
- Determine the impact on outcomes
- Determine whether the objectives are met
- Determine whether the theory needs revision
- Summarize what was learned

Act

- Prevent recurrent deviation
- Redesign products or processes

Note: SDCA = *Standardize-Do-Check-Act.*

TABLE 3-2

PROCESS IMPROVEMENT MODEL ELEMENTS (Continued)

- **Improve the process (PDCA) (Continued)**
  - Act (Continued)
    - Implement permanent change in the process
    - Continue to collect and analyze data
    - Document and standardize the change
    - Continuously monitor the process
  - Develop a strategy for further improvement
  - Repeat SDCA and PDCA cycles
- **Assess improvement performance**
  - Organize data
  - Document project results in picture-book format
  - Make final presentations of PDCA story
  - Evaluate team methods
  - Evaluate project results
  - Recommend follow-up activity
  - Celebrate PDCA cycle completion
  - Recognize and reward TQM behavior
  - Select a new process to improve

Note: SDCA = *Standardize-Do-Check-Act*.

INDIVIDUAL-IMPROVEMENT MODELS

While you hope to improve your organization through a transformation that creates a culture of continuous improvement, the organization does not change itself. As valuable as team efforts in a formal organization structure may be, the real force behind changing your organization's culture is the cumulative impact of all individuals' efforts to improve their jobs, their situations, and themselves. Individual-improvement models are helpful in focusing the personal improvement efforts of every person in your organization. To some extent they embody the objectives and ideals of the organizational transformation models on a smaller, individual scale.

Individual self-improvement techniques, both internal and external to formal improvement efforts, provide the means by which any person may apply TQM-style structure and discipline to everyday activities. Individual-improvement models address this application of structure, discipline, and technique and also address the individual's interaction with superiors and subordinates and with formal organizational systems. The models are concerned with the same issues as the organizational transformation models: envisioning the individual's goal for personal improvement and enabling that vision; focusing the individual's improvement efforts and performing those efforts in a structured, disciplined manner; and educating and training the individual to provide the knowledge necessary to undertake a individual-improvement effort.

You may wish to pursue your own individual-improvement effort. To do so you would do well to construct your own personal model, given your situation within your organization and your organization's environment. Tailor the model so it applies to you specifically, but within the context of your organization's larger improvement effort. Table 3-3 lists a number of elements you should consider in constructing your own personal model; the elements listed are those considered the most essential for successful improvement efforts. Appendix A provides you some examples of how these elements may be applied.

TABLE 3-3

INDIVIDUAL-IMPROVEMENT MODEL ELEMENTS

Envision personal improvement
- Cultivate your self-awareness/image
- Develop behavior/expectation matrices
  - Assess relationship with your supervisor
  - Assess relationships with your peers
  - Assess relationships with your subordinates
  - Assess relationships with the union
  - Assess relationships with your customers
- Evaluate your need/desire to improve
- Create a personal vision for improvement

Enable personal improvement
- Improve your education
- Study TQM concepts
- Attend TQM conferences
- Pursue training just in time
- See your job as a learning experience
- Learn to use the TQM tools
- Learn to measure and understand processes
- Learn to use data to support your decisions
- Learn to differentiate data from information
- Seek support for your improvement effort

Focus on improvement
- Examine your mission
- Establish your goals and objectives
- Communicate your goals
- Develop a personal-improvement strategy/plan
- Create job outcome/TQM behavior matrix
- Describe your behavior vis-a-vis subordinates
- Perform a personal signal analysis
- Make improvement a high priority
- Make time in your schedule to improve
- Organize your activity to make improvement possible
- Recognize your responsibility to improve
- Take advantage of learning opportunities

TABLE 3-3

INDIVIDUAL-IMPROVEMENT MODEL ELEMENTS (Continued)

Improve your job
- Define your job
- Recognize the processes you own
- Address your job processes
- Understand how your processes link to others
- Understand the capabilities and limitations of your processes
- Know your customers
- Understand your customers' needs and expectations
- Establish routine dialogue with your customers
- Identify problem areas in your job
- Address critical areas first
- Use a systematic approach to improvement
- Remove complexity and simplify your job
- Pursue small incremental improvements

Improve yourself
- Constantly challenge your behavior
- Demonstrate leadership
- Demonstrate commitment
- Take initiative
- Take a long-term view
- Set an example
- Maintain self-control
- Align your activities with your goals
- Continuously pursue your goals
- Expect improvement in yourself
- Make personal improvement a routine
- Become a good team player
- Foster cooperation
- Foster communication
- Be observant
- Become a good listener
- Open up your communication channels
- Remove the barriers you erect

TABLE 3-3

INDIVIDUAL-IMPROVEMENT MODEL ELEMENTS (Continued)

Improve yourself (Continued)
Work to eliminate your fears
Don't be unduly critical of yourself
Pursue innovative thinking and new ideas
Eliminate roadblocks
Trust and deserve trust
Help others improve
Make time in your schedule to help others improve
Involve others in decision processes
Train others
Coach and nurture
Create more leaders
Facilitate teamwork
Help remove others' barriers
Learn what questions to ask and how to ask them
Encourage small improvements by others
Promote innovative thinking by others
Support implementation of subordinates' ideas
Welcome the news of problems as opportunities
Expect improvement in others
Help remove the sources of others' fears
Welcome the new ideas of others
Evaluate your improvement
Recognize the value of correct effort versus results
Judge others fairly and correctly
Don't be unduly critical of others
Document improvement in an improvement journal
Celebrate your successes
Celebrate the successes of others

SUMMARY

You should model your planned improvement effort before you begin. Constructing a model will help you lay out your proposed effort in your mind and will help in communicating your plans to others. You will discover ways in which your planned effort might be improved even before you begin. The elements listed in the tables of this chapter are suggestions for items to consider when constructing your models; they are suggestions that have been proven in practice, however. The examples in Appendix A will provide you additional ideas for developing your own models.

You begin your improvement effort now. It should be an exciting journey of self-discovery, action, and improvement. Good luck and joy on your journey!

REFERENCE MATERIAL

Continuous improvement requires the continuous acquisition of new knowledge. The knowledge of many individuals who have already started their own Total Quality Management (TQM) journeys is reflected in the wide variety of books, articles, and audio-visual materials now available. This listing of reference material is by no means exhaustive, but it is intentionally extensive for the benefit of those who may wish to begin their own reference libraries. The list is divided into a suggested reading section that contains material you may find particularly useful while getting started and an additional reading section that may provide useful concepts and ideas to expand your overall understanding of the TQM concept.

SUGGESTED READING - BOOKS

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The Deming Videotapes: Quality, Productivity, and Competitive Position. Massachusetts Institute of Technology.

Type Z: An Alternative Management Style. Film. 105 minutes. Professor William Ouchi.

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1621 N. Kent Street, Room 1112-RPE
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(703) 235-2930

Defense Systems Management College
Fort Belvoir, VA
(703) 664-2457

Naval Personnel Research and Development Center
San Diego, CA
(619) 553-7979

Logistics Management Institute
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APPENDIX A

SOME MODELS FOR IMPROVEMENT

SOME MODELS FOR IMPROVEMENT

INTRODUCTION

In this appendix we present several of the most popular improvement models. Each model addresses a specific aspect of improvement. Therefore, while they share many attributes in common, they differ significantly in many fundamental ways. The approach that may best suit your needs may well be a synthesis of these various approaches. The models fall into three general categories: (1) organizational transformation models, (2) process-improvement, or problem-solving, models, and (3) individual-improvement models.

An organizational transformation model addresses the process of organizational change. It is concerned with management structures, environmental factors, and a broad array of issues relevant to the overall organization. Five basic transformation models are examined here: the Defense Systems Management College's (DSMC's) Quality and Productivity Management Practices (Q&PMP) Model;[1] the DSMC/Advanced Technology, Inc. (ATI) Performance Improvement Model;[2] the Process Management Institute's (PMI's) Improving the Quality of Management Processes (IQMP) Model;[3] the Joiner Associates' Streams of Activity Model;[4] and the Logistics Management Institute's (LMI's) Continuous Improvement Process (CIP) Model.[5]

Process-improvement models address the creation of positive change in the way work is accomplished. They address the defining of work flows, strengthening of supplier-customer relationships, elimination of non-value-added effort, reduction of

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[1]*Quality and Productivity Management Practices on Defense Programs.* Fort Belvoir, Va.: Defense Systems Management College. 1988.

[2]Ibid.

[3]*Improving the Quality of Management Processes (IQMP) Model.* Process Management Institute. Bloomington, Minn. 1989.

[4]Joiner Associates, Inc. Madison, Wis. 1989.

[5]Mansir, Brian E., and Nicholas R. Schacht. *Introduction to the Continuous Improvement Process: Principles and Practices.* LMI Report IR806R1. Aug 1989.

variation, and controlling of processes. Five basic process-improvement models are examined here: the Moen and Nolan Strategy for Process Improvement;[6] the Naval Personnel Research and Development Center (NPRDC) Total Quality Management (TQM) Process-Improvement Model;[7] the Florida Power and Light (FPL) Improvement Opportunity Process;[8] the Joiner Associates' Model of Progress;[9] and the LMI CIP Model.[10]

Individual improvement models are techniques for individual self-improvement, both internal and external to formal TQM efforts. They provide techniques by which any person may apply TQM-style structure and discipline to his/her everyday activities. Individual improvement models also address the individual's interaction with superiors and subordinates and with formal organizational systems. The models presented here are the PMI Leadership Expectation Setting (L.E.S.) Model,[11] the PMI Quality Journal,[12] and the LMI CIP Model.[13] Each is described briefly below and in more detail in the references.

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[6]Moen, Ronald D., and Thomas W. Nolan. "Process Improvement: A Step-By-Step Approach to Analyzing and Improving a Process." *Quality Progress*. Sep 1987.

[7]Dockstader, S.L., and A. Houston. *Defining the Deming Cycle: A Total Quality Management Process Improvement Model*. San Diego, Calif. Navy Personnel Research and Development Center. 1988.

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[9]Scholtes, Peter R., et al. *The Team Handbook*. Madison, Wis. Joiner Associates, Inc. 1988.

[10]Mansir, Brian E. Ibid.

[11]Schultz, Louis E. *L.E.S. Management*. Bloomington, Minn. Process Management Institute. 1989.

[12]Schultz, Louis E. *The Quality Journal*. Bloomington, Minn. Process Management Institute. 1989.

[13]Mansir, Brian E. Ibid.

ORGANIZATIONAL TRANSFORMATION MODELS

DSMC Q&PMP Model

The DSMC Q&PMP Model, shown in Figure A-1, is a broad conceptual model with interrelated actions and emphases that describe a general process for transformation from the point at which an organization recognizes that it needs change to the point at which it becomes a competitive organization of the future. The model depicts an organization as an open system with various feedback loops from the environment and highlights the interrelationships between the various components of a quality and productivity management effort. The concepts are briefly discussed below, and a significantly more detailed discussion is provided by DSMC.[14]

Organizational System

The "organizational system" box in the middle of the model represents the system in which you exist; it could be an entire company, a division, a plant, a department, or just your own day-to-day activities. The system has upstream systems (internal and external suppliers) which provide inputs in the form of labor, material, capital, energy, and data/information. The system takes these inputs and converts them into outputs in the form of products or services. Downstream systems (internal and external customers) then react to those outputs, creating outcomes (customer satisfaction, readiness, profitability, etc.). Quite often, we do not take the time to define, in very specific terms, the systems we manage. You cannot begin to measure or improve quality and productivity until you do this.

Incentive and Strategies for Change

At the top of the diagram is the new competition the organization must respond to in order to compete in a global economy. This new competition and global economy influence our business strategy and our visions of the organization of the future. We then assess our present organizational performance and use this data as a foundation for developing plans for performance improvement. Key performance indicators are identified to provide feedback on our progress.

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[14]*Quality and Productivity Management Practices on Defense Programs*. Ibid.

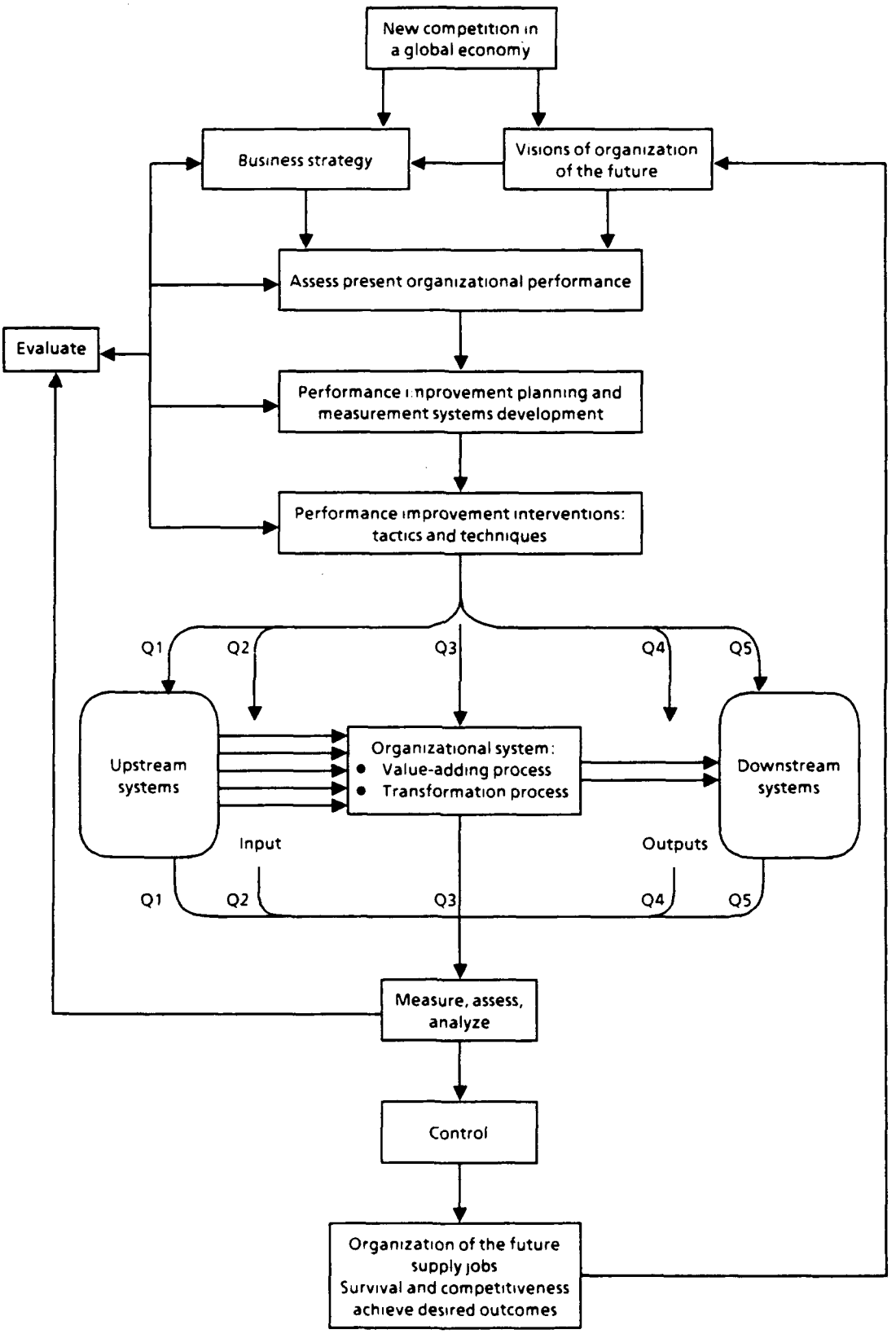


FIG. A-1. DSMC Q&PMP MODEL

The following steps are included in an effective strategic planning process:

- Developing a collective strategic awareness among the management team
- Converting that awareness into specific planning assumptions
- Creating a set of agreed-upon, prioritized strategic objectives
- Focusing those objectives into a series of action items
- Determining who will be accountable and responsible for each action item and developing teams to take action
- Measuring, assessing, and evaluating the effectiveness of improvement actions
- Continuously supporting the improvement effort.

Performance Improvement Methodology and Techniques

Out of the performance-improvement planning process comes specific performance-improvement interventions, tactics, and techniques. Note that these interventions are happening at five checkpoints: upstream systems, inputs, process, outputs, and downstream systems. Quality management efforts must be defined relative to these five checkpoints. In effect, TQM is the commitment to a practice of managing all five quality checkpoints. Your management team then develops, through the performance-improvement planning process, a balanced attack to improve total system performance, not just system subcomponents.

A number of tools and techniques are available to improve quality and productivity. A major shortcoming of many improvement efforts is that improvement is approached like a buffet at a restaurant – we pick and choose one improvement technique or another with no grand strategy to guide us. Long-term, effective quality and productivity improvement requires the use of many different approaches, tactics, tools, and techniques in a comprehensive and integrated manner.

Measurement and Evaluation

After you make interventions to the system, you must then measure, assess, and analyze performance at the five checkpoints to assess whether the expected impact actually occurred. Based on this data, you may make an evaluation relative to your business strategy, your environment (both internal and external), your vision, your plan, and your improvement actions themselves. Note that the process of

evaluation is separate from the process of measurement. In addition, measurement supports improvement as its primary objective. The organizational system or unit of analysis being measured must be precisely defined in order to avoid confusion. A number of measurement and evaluation techniques may be used in this regard.

If your organization has an effective, high-quality management process in the areas of planning, measurement and evaluation, and control and improvement, it will achieve its vision of the future and its desired outcomes over the long term. An integrated approach to continuous improvement is essential to this achievement.

DSMC/ATI Performance-Improvement Model

The DSMC/ATI Performance-Improvement Model, shown in Figure A-2, is primarily an improvement-project-creation model. It has seven steps that begin with establishing a TQM cultural environment and result in implementing a continuous cycle of improvement projects aimed at improving organizational performance. Each step is briefly described below and a more detailed discussion of the presented model is provided by DSMC.[15]

Step 1: Establish the TQM Management and Cultural Environment

The TQM process is a total organizational approach toward continuous improvement of products and services. It requires management to exercise the leadership to establish the conditions for the process to flourish. Management must create a new, more flexible environment and culture which will encourage and accept change. The new culture is developed and operated so that all the people, working together, can use their talents to contribute to the organization's objective of excellence. Management must accept the primary responsibility itself and understand the prolonged gestation period before the new systems become alive and productive.

Management is responsible for the following activities:

- Providing the vision for what the organization wants to be and where it wants to go
- Demonstrating a long-term commitment to implement improvement

[15]*Quality and Productivity Management Practices on Defense Programs*. Ibid.

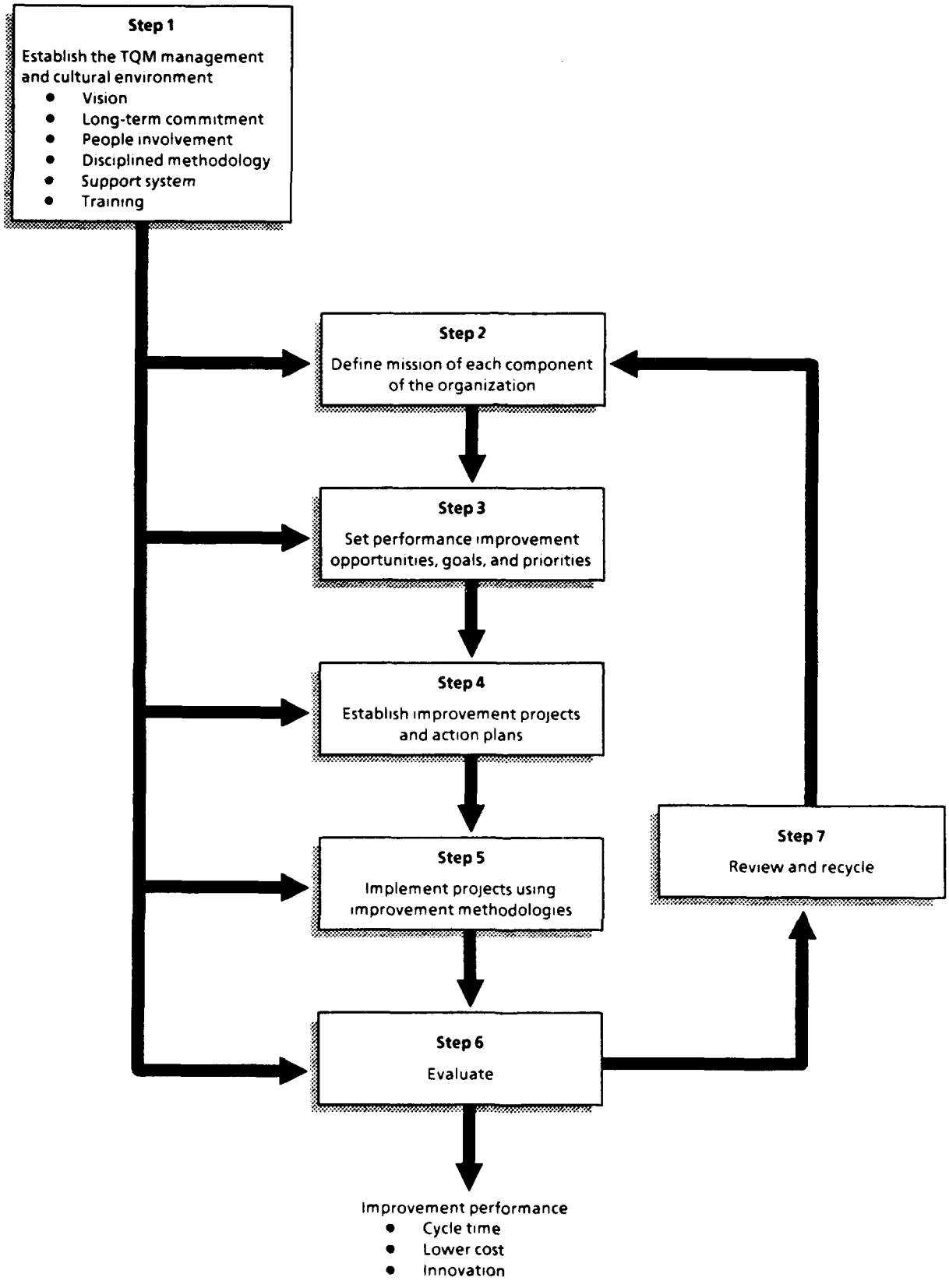


FIG. A-2. DSMC/ATI PERFORMANCE-IMPROVEMENT MODEL

- Actively involving all people in the improvement process
- Using a disciplined approach to achieve continuous improvement
- Ensuring that an adequate supporting structure is in place
- Making all employees aware of the need for and benefits of TQM, and training them in the philosophy, practices, tools, and techniques that support continuous improvement.

Step 2: Define the Mission

The mission of each element of an organization must reflect a perspective such that, when combined with other elements of the organization, it will provide the synergy that produces TQM. You should identify your customer(s), their requirements, your processes, and your products; develop measures of your output that reflect customer requirements; and review the preceding steps with your customer and adjust them as necessary. Define your organization's mission with respect to those characteristics.

In developing this mission, all members of the organization must know the purpose of their jobs, their customer(s), and their relation to others in the organization for providing customer satisfaction. Everyone has a customer (internal or external). One objective of TQM is to provide customers with services and products that consistently meet their needs and expectations. Everyone must know his/her customers' requirements, and must also make suppliers aware of those and other relevant requirements.

Step 3: Set Performance Improvement Goals

Improved performance requires improvement goals. Both involve change. Steps 1 and 2 determine where the organization wants to go, how it is now performing, and what role each member will play in achieving improved organizational performance. Step 3 sets the goals for performance improvement. These goals must reflect an understanding of the organization's process capabilities so that realistic goals may be set. The goals should first be set at the senior-management level. They should reflect strategic choices about the critical processes in which success is essential to organizational survival.

Middle and line management set both functional and process-improvement goals to achieve the strategic goals set by senior management. This hierarchy of

goals establishes an architecture that links improvement efforts across the boundaries of the functional organization. Within functional organizations performance-improvement teams provide cross-functional orientation, and the employees on those teams become involved in process issues. Thus, the entire organization is effectively interlinked to form an ideal performance-improvement culture.

Step 4: Establish Improvement Projects and Action Plans

The initial direction and the initial goals set for continuous-improvement teams flow down from and are determined by top management. The steering group performs the following activities:

- Develops the TQM philosophy and vision
- Focuses on critical processes
- Resolves organizational and functional barriers
- Provides resources, training, and rewards
- Establishes criteria for measuring processes and customer requirements.

It charters subordinate Quality Management Boards (QMBs) as owners for each of the critical processes.

The QMBs conduct system and process analysis, select and train performance-improvement teams, develop improvement plans, track progress, provide facilitators to support teams, aim at continuous process improvement, and apply a structured process improvement methodology. The performance-improvement teams focus on specific process improvements using the structured improvement methodology.

Step 5: Implement Projects with Performance Tools and Methodologies

Improvement efforts follow a structured improvement methodology. This methodology requires the improvement team to define its customers and processes, develop and establish measures for all process components, and assess conformance to customer needs. Analyzing the process will reveal various improvement opportunities, some of which will be more valuable or achievable than others. Opportunities are ranked by priority and improvements effected.

The improvement methodology is cyclic and unending. As one opportunity is pursued and improvements effected, new opportunities are identified and prioritized. Appropriate performance tools are employed at various points in the process.

Step 6: Evaluate

Measurement is an essential element of the continuous improvement process. It focuses on the effectiveness of improvement efforts and identifies areas for future improvement efforts. A basic need in all improvement efforts is the ability to measure the value of the improvement in units that are pertinent and meaningful to the specific task. For example, one evaluation of the "before" and "after" levels of customer satisfaction following an improvement effort might include the numbers of customer complaints. You should also evaluate the method of your performance improvement.

Most organizations have existing measures that may be used "as is" or modified as necessary. No menu of measurements is applicable to all users. The key is to select measures that can be used by work units to manage and evaluate their products and services so that continuous process improvement may be undertaken.

Step 7: Review and Recycle

You must perpetuate the continuous improvement process forever. Approaches to TQM that have limited lifetimes will become ineffective if left unattended. You and all your people will need to review progress with respect to improvement efforts and modify or rejuvenate existing approaches for the next progression of methods. This constant evolution reinforces the idea that TQM is not a "program" but a new expectation of day-to-day behavior for each member of the organization.

PMI IQMP Model

"IQMP" in the PMI IQMP model is the acronym for "Improving the Quality of (the) Management Process(s)." The model has some unique features that set it apart from all other transformation models. Indeed, many managers, particularly senior managers long accustomed to the conventional wisdom, feel uncomfortable about

IQMP initially. Only after experiencing the benefits of IQMP in action are they convinced of its merits. The following features of the PMI IQMP model are unique:

- It unabashedly focuses on the organization's need to follow Deming's 14 principles more closely.
- In deference to management's resistance to "theory," it refers to the 14 principles in terms of a "philosophy." However, it clearly sees the 14 principles as postulating a theory of management and constructs organization-wide experiments specifically designed for managers at all levels to disprove this theory; disproof, not proof, being the route to gaining knowledge.
- It recognizes that virtually everyone in the organization prefers to live with Deming's theory rather than with the unacknowledged and highly varied theories of their current management – but they are prevented from doing so by obstacles as yet unidentified and therefore unaddressed. People are not unwilling nor unready; they are unable.
- It also recognizes that the farther one goes from senior management and the closer one gets to the actual work of the organization, the quicker people are to grasp the theory. Therefore, while senior managers must be committed to the overall thrust of the theory, educated to the point of supporting a critical mass of managers trying to practice the theory, and given roles that they and only they can perform, they are not expected to direct the rest of the organization through the entire transformation; rather, the rest of the organization is expected, through data-supported experiments, to direct its senior managers. In effect, the model inverts the organization.
- It incorporates the use of problem-prevention techniques in applying process controls across the entire organization.
- It is designed under the concept of the expanding ripple, not the big bang. Thus, most managers, while knowing that the transformation process is underway and trained to take advantage of the problem-prevention techniques, will participate directly in the model 2 years or more after the transformation process has been initiated. The whole organization, of course, benefits from the experiments.

The PMI IQMP Model is primarily a team-development model. Its overriding philosophy of continuous improvement is shown in Figure A-3. It has three stages, as shown in Figure A-4, encompassing a specific process for transformation that starts with top management and ends with a team structure in place prepared to conduct

experiments in process improvement activity. Each components is briefly described below. A more detailed discussion is provided by PMI.[16]

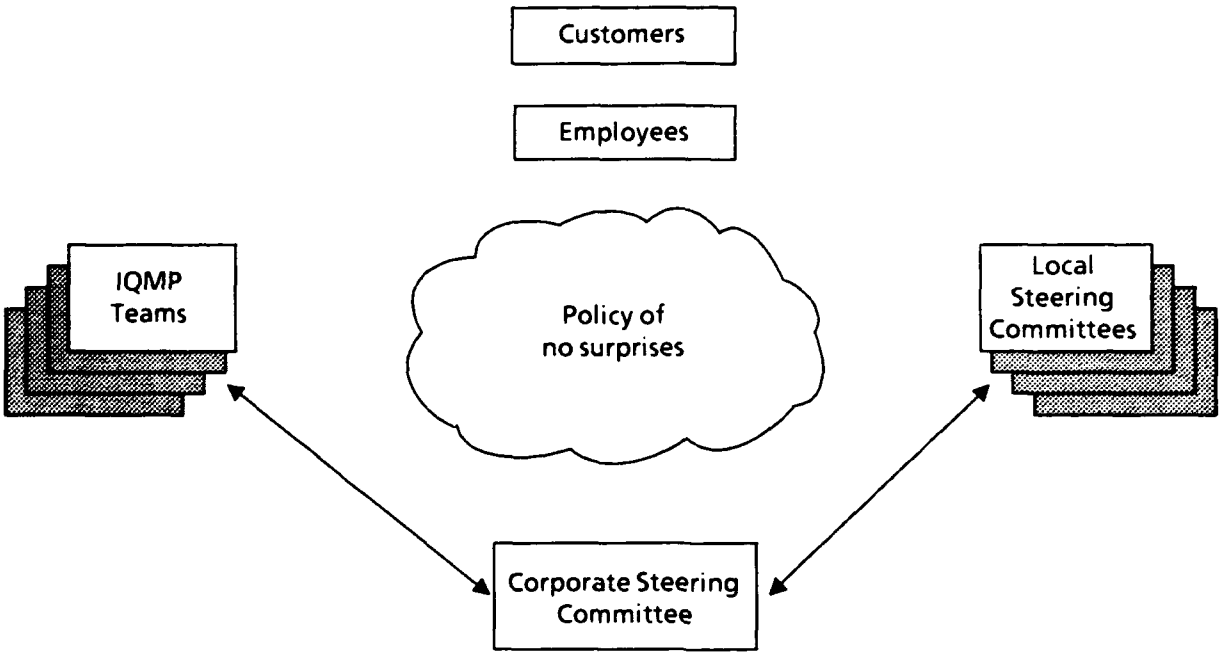


FIG. A-3. STRUCTURE FOR CONTINUOUS IMPROVEMENT

While the model provides management with bottom-up direction, it is developed and implemented in a top-down manner. Each component will go through transition from education to training to implementation to a steady state of continuous improvement. The major activities of each component are described below. The model integrates the cultural transformation, which takes TQM beyond the "program of the year" attitude and the methodology for improving work processes (the technology and tools of continuous improvement).

Corporate Steering Committee / Team

The Corporate Steering Committee (CSC), or Division Steering Committee (DSC), has the primary responsibility for interpreting the Deming principles/TQM for the organization. Composed of the top executive, plus his/her staff, the charter for

[16]*Improving the Quality of Management Processes (IQMP) Model.* Ibid.

the CSC is found in the question: "*What* do we think Deming's principles/TQM mean for this organization?"

In addition to the normal tasks of carrying on the work of the organization, the CSC members research the Deming principles in terms of what Deming means and what each principle means to the organization. This suggests that each CSC member gets to know the organization much more intimately than traditional practices might encourage. It also suggests research into how people work and feel about work as well as into the reality of corporate policies and practices. CSC members look at how they need to operate differently and mobilize others in the business unit to offer recommendations and advice.

During the education stage, the CSC has a major responsibility for "championing" the principles throughout the organization, ensuring that all employees recognize that the transformation is real, and modeling the expected new management behaviors. During the application stage and continuing into the continuous-improvement stage, the CSC has a responsibility to receive/act on recommendations from IQMP Groups and Local Steering Committees (LSCs) on matters of need identified in the organization. It is the job of the executives to support the organization.

The CSC has 10 major areas of responsibility:

1. Establish awareness of the competitive challenge throughout the organization.
2. Establish a vision for the future.
3. Establish leadership for the change effort.
4. Establish a process to encourage/support innovation.
5. Establish broad employee involvement in the effort.
6. Establish proper organizational structure for the effort.
7. Establish appropriate technology.
8. Establish plans for the ongoing development of all employees.
9. Establish a plan to guide the process improvement effort.
10. Establish total quality improvement as a way of life in the organization.

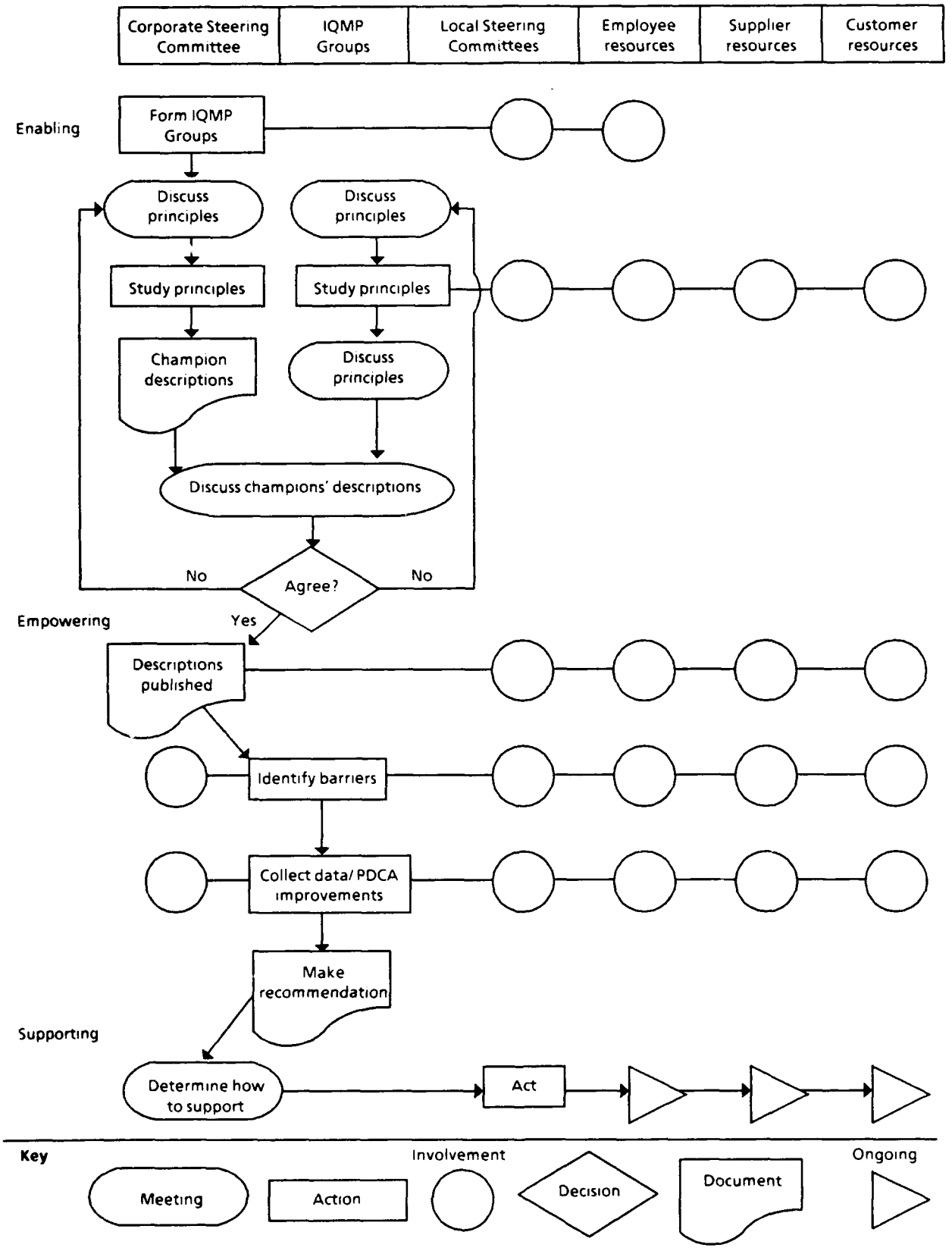
Local Steering Committees / Teams

The LSCs have the primary responsibility for enabling continuous improvement in the workplace as shown in Figure A-4. Their focus is on day-to-day implementation of actions to improve work processes. There are normally as many LSCs as there are independent business units in an organization, and each is composed of the local facility or regional manager plus his/her staff. (Often, a corporate or division office becomes an additional LSC to work on improving the work processes of the office functions.)

The job of the LSCs is to ensure that employees are provided the work tools – including the statistical process control (SPC) training – they need to do their work; the LSCs must also respond to the needs that become apparent through the data gathered by those who do the work. These jobs may require independent implementation of specific changes (with appropriate communications to other LSCs in which there might be an application), implementation of CSC and/or IQMP recommendations, or coordination of actions determined to be jointly useful to several business units. The charter for the LSCs is found in the following two questions: "How do we make a difference in the technical work?" and "How do we support implementation of the IQMP Groups' recommendations?"

It has been found that a "policy of no surprises" is essential to developing trust between the work groups. This is typically dealt with by encouraging people to talk informally, as well as by sharing of meeting notes among the various groups and committees. This kind of structure is not in any way intended to reduce the importance of "common sense" or good communications. The structure is meant to enhance and encourage the use of both. When differences of opinion arise, as they surely do, the focus is placed on the customer needs and the data presented, rather than on such traditional bases as territoriality, or "I'm the boss, that's why." Helping people to find ways to resolve differences constructively is perhaps another good reason for working through the transformation process with a consultant. The LSC has several areas of responsibility:

- Leading the tactical changes in the management process
- Examining the "operational definitions" of Dr. Deming's 14 points for any variance that may be required at the local site



Note: PDCA = ***Plan-Do-Check-Act*** Cycle or Shewhart Cycle

FIG. A-4. MANAGEMENT PROCESS IMPROVEMENT FLOW

- Clarifying mission statement at local level to ensure it is in concert with the new philosophy
- Discussing the impact of the 14 principles in managing their organization
- Defining customer expectations
- Identifying early improvement potential.

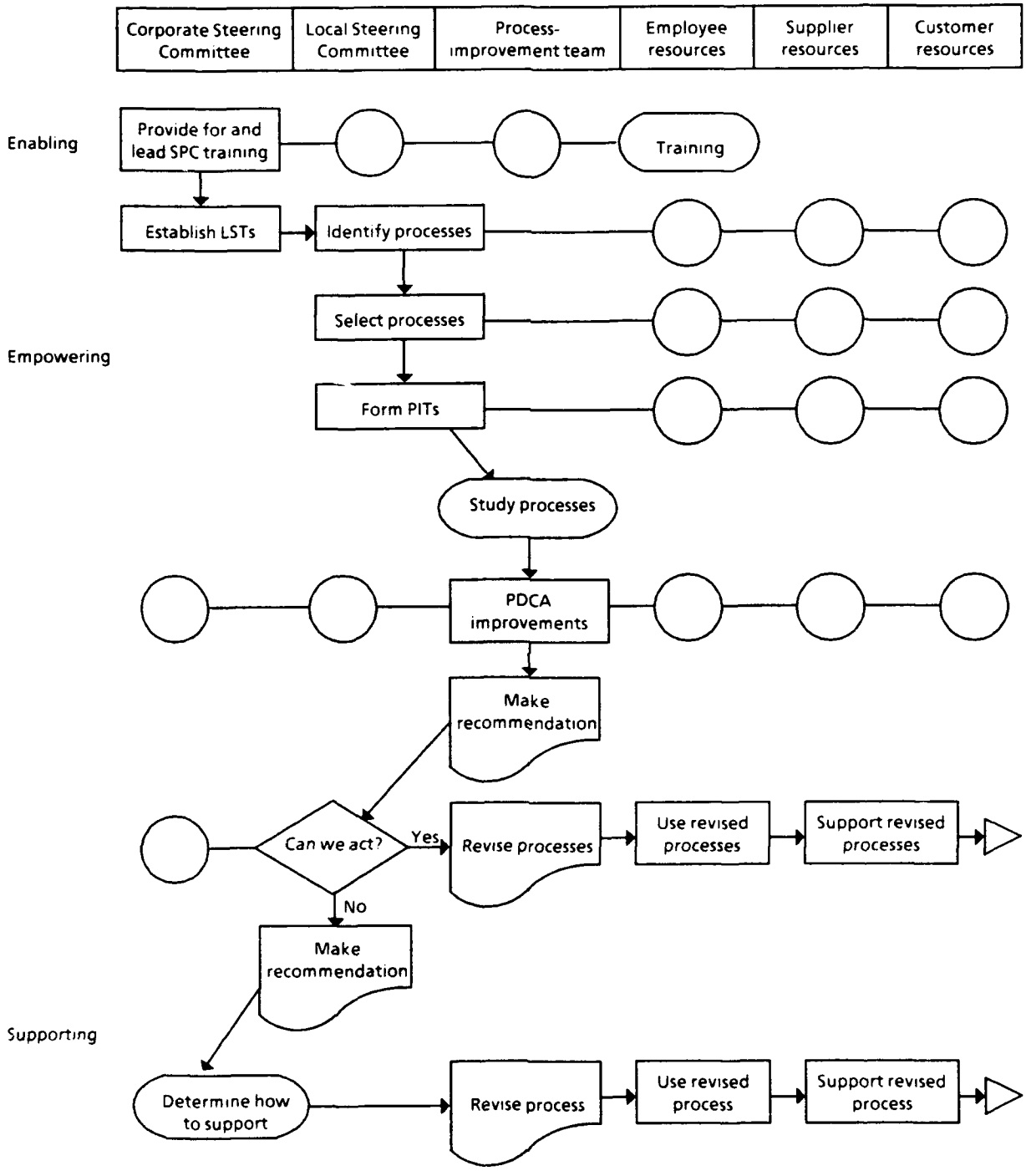
IQMP Teams

The IQMP Teams have the primary responsibility of improving the quality of management in the organization as shown in Figure A-5. Composed of a "lateral slice" of the organization, primarily from the ranks of management but not necessarily limited to managers, the IQMP Teams must actively seek out obstacles to Deming's 14 principles and find ways to remove the obstacles by making improvement recommendations.

Normally composed of several working subgroups, based upon focus on related groups of principles, the charter for the IQMP Teams is inherent in the question: "*How* do we make a difference in the management work?" IQMP Team members work closely with individual principle champions from the CSC, as well as representing a cross-section of the organization's management, naturally working closely with those on the Local/Regional Steering Committees.

Members of IQMP normally serve 1–2-year terms, so that new ideas are introduced regularly, but a sense of continuity is preserved in that not all members are new to the task each year. The IQMP Teams:

- Are established after the top management team/committee is comfortable with its work relative to mission and strategic direction
- Are chartered to identify the obstacles that prevent the organization from following Deming's principles more closely and to make specific recommendations directly to senior management on how to reduce those obstacles
- Define and diagnose progress
- Ensure a policy of no surprises by working with the DSC and the LSC when appropriate
- May identify potential improvement projects for any part of the organization.



Note: LST = Local Steering Team; PIT = process-improvement team.

FIG. A-5. WORK FLOW FOR PROCESS IMPROVEMENT

The PMI IQMP Model directly addresses management processes – or, rather, the lack of them. As previously stated, it focuses on Deming's 14 principles with the intention of trying to disprove Deming's theory for management. It was also stated that the PMI IQMP Model complements the use of problem-prevention techniques across the entire organization. While IQMP incorporates the same techniques, the application of these techniques in functional and operational processes is not part of the PMI IQMP Model as such. However, this complementary work on process improvement is being done alongside the management work addressed by the PMI IQMP Model. If the management work is not addressed, then the functional and operational processes will not be continuously improved.

Project Teams

Work process improvements are undertaken by project-oriented process-improvement teams formed by LSCs. These project teams

- Will lead the operational change in the management process
- Are voluntary
- Will study specific issues using appropriate SPC technology and problem-solving methods
- Will make recommendations to the appropriate steering committee
- Will keep nonteam members informed
- Will work with Plant Steering Committee on implementation issues
- Will dissolve at the appropriate time.

Streams of Activity Model

The Joiner Associates' Streams of Activity Model, shown in Figure A-6, characterizes the ongoing activities and emphases necessary to achieve continuous improvement in an organization. It presents activities that pervade every organizational function and addresses the underlying elements that must be present for a successful improvement effort: supporting environment; a quality management approach to key activities and their review; a cadre of internal improvement experts; and a supportive, capable education and training community. The streams of activity are parallel and unending; they proceed independently but are interdependent.

There is no temporal relationship between the streams – you pursue them simultaneously.

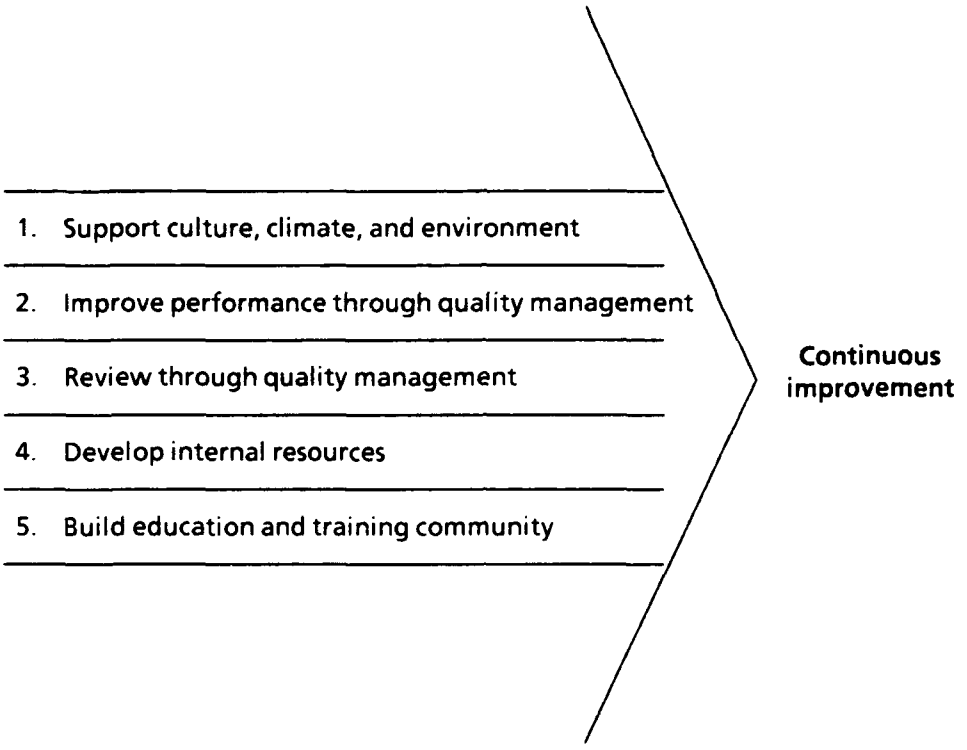


FIG. A-6. JOINER ASSOCIATES' STREAMS OF ACTIVITY MODEL

Stream 1: Assess and Develop the Culture, Climate, and Environment to Support and Sustain Continuous Improvement

This stream addresses the operational definition and deployment of Dr. Deming's 14 points into the organization and the development of a process involving lower levels of the organization. Activities in this stream include asking yourself about each of the 14 points: Why are they important? What do they accomplish? You must define for yourself an ideal picture of your organization and then define where your organization is now. Each level of your organization must ultimately be involved in this process, relating the 14 points to their objectives and their understanding of their organizational role. You must pursue actions to deploy the 14 points and their objectives throughout your organization.

Stream 2: Apply the Quality Management Approach to the Way You Carry Out Improvements and Other Key Activities

The second stream reminds you that you should apply quality management principles, practices, and techniques not only to your improvement activities but to everything you do within your organization. To do this you must establish a systematic approach that involves management and ensures management priorities are reflected by improvements and other key efforts. Existing work groups are focused by their management and work to achieve local priorities. You should ensure a quality management approach is applied to each new initiative you undertake.

Stream 3: Apply the Quality Management Approach to the Way You Review Improvement Activities and Other Key Aspects of the Business

Reviewing and evaluating progress is as important as undertaking new improvements or other initiatives. Not only should you adopt a quality management approach to every aspect of your business, you should also apply this approach to reviewing improvement efforts and to reviewing progress in all other areas as well. Ensure statistics and data support your reviews, and that you use the data in evaluating improvement efforts and other everyday business issues. Use these evaluations to identify needed changes in management emphasis and approach, and to support and enable more rapid improvement and achievement of organizational goals.

Stream 4: Identify and Develop a Cadre of Internal Resources with In-Depth Knowledge and Skills

To enable the flow of the first three streams of activity, you should identify and develop people within your organization who will become your internal experts in quality management and improvement philosophy, practices, and techniques. This effort includes identifying capable individuals, educating and training them, and establishing their new positions along with a career path and opportunities. You then can use these people to help you in your improvement efforts and also in applying quality management methods to key business issues.

Stream 5: Build an Education and Training Community That Can Drive New Knowledge into the Organization

Underlying the other four streams of activity is a continual, strong current of learning which supports and nourishes the continuous-improvement effort. This

stream of activity provides the new knowledge necessary to undertake improvements, to apply quality management to everyday business practices, and to increase the capability of individuals to do their jobs. You must identify your education and training community and develop processes and systems for addressing the organization's learning needs and reviewing your effectiveness in meeting those needs. This includes determining who to educate, when, and to what extent in which subjects.

LMI CIP Transformation Model

The LMI CIP Transformation Model, shown in Figure A-7, is a transformation model that focuses on the organizational and behavioral changes needed to instill and sustain a culture of continuous improvement in your organization. The organization develops a unified, consistent vision of its goals and objectives, and achieves that vision by providing the leadership and resources necessary to implement TQM as well as eliminating barriers to TQM implementation. Broad goals are focused down through all the organization's layers, and improvement practices follow a structured, disciplined methodology. Training and team building have fundamental supporting roles throughout the LMI CIP Transformation Model, as people and groups in the organization must be trained in appropriate subjects at appropriate times, and groups must learn to function as teams. The ultimate objective is to establish a perpetual and total commitment to quality throughout the organization and to involve everyone. TQM should become the organization's way of life.

Envisioning

Envisioning, illustrated in Figure A-8, is a process that includes developing your organization's overall mission and goals and, within the context of that overall mission, building individual and group awareness of TQM objectives, philosophy, principles, and practices. Your organization should document its mission and establish the constancy of purpose essential to a successful TQM effort. Creating a customer focus is a key element of improving your organization's effectiveness. Each individual must demonstrate belief in the organization's mission and ownership of its vision. An Executive Steering Committee (ESC), led by the head of your organization, guides and leads the overall TQM effort, which becomes integrated into your organization's way of doing business. The ESC is also instrumental in enabling the achievement of the mission.

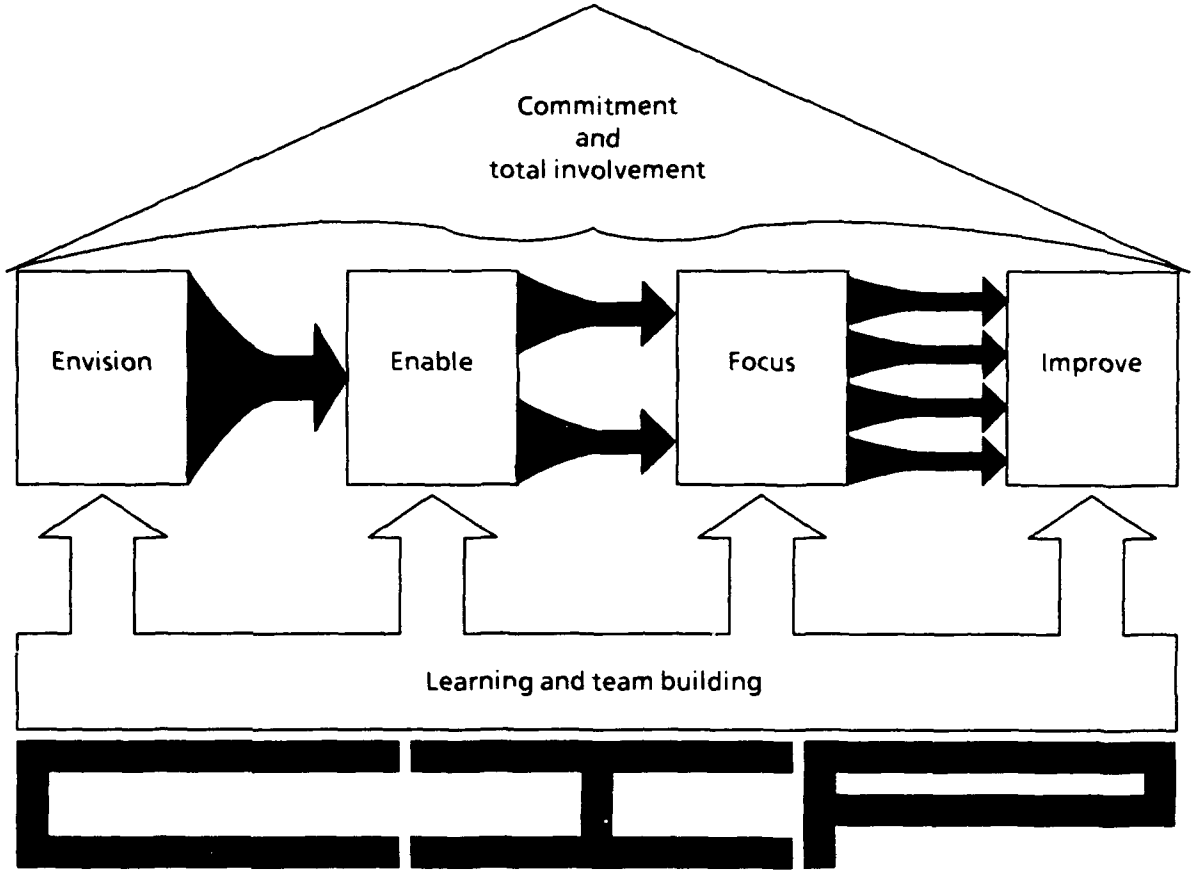


FIG. A-7. LMI CIP TRANSFORMATION MODEL

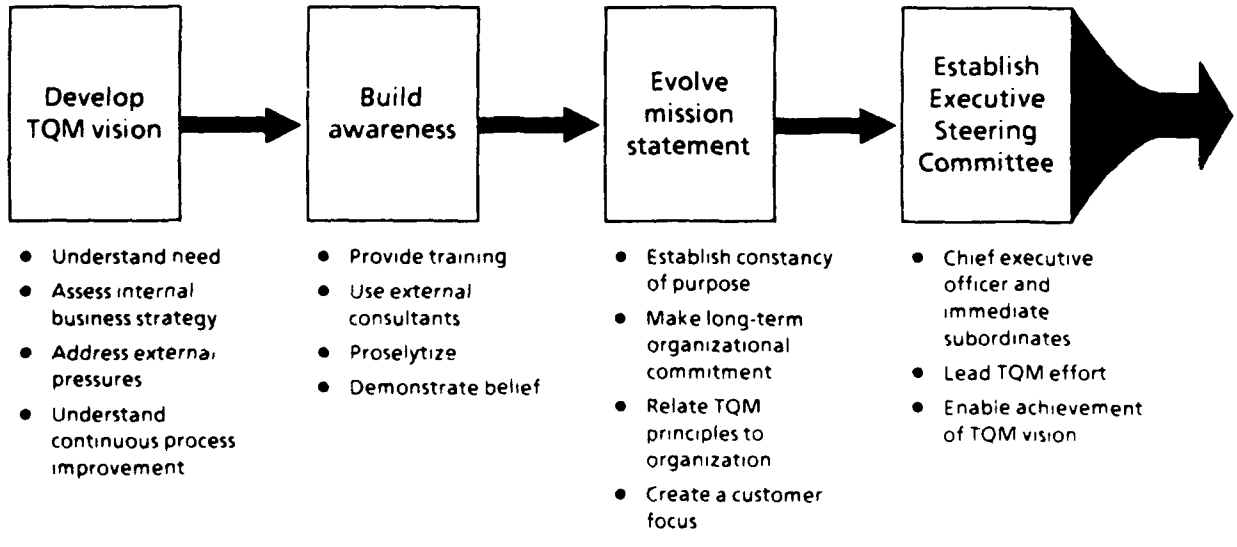


FIG. A-8. ENVISIONING

Enabling

Enabling, depicted in Figure A-9, is the process by which you make it possible for your organization to implement TQM principles and practices. It includes individual and organizational efforts to create an environment that will support and nurture the TQM effort. Top management must become committed to the TQM implementation and must demonstrate that commitment; highly visible and vocal champions can help publicize that commitment. You and every other leader must work to remove barriers to TQM and to establish support, reward, and recognition systems that encourage TQM behavior and drive out the inherent fear of change. Training and time resources, both for yourself and those who work for you, are essential. Finally, your organization must empower individuals and groups at all levels by providing them the authority necessary to meet their responsibility for process improvement.

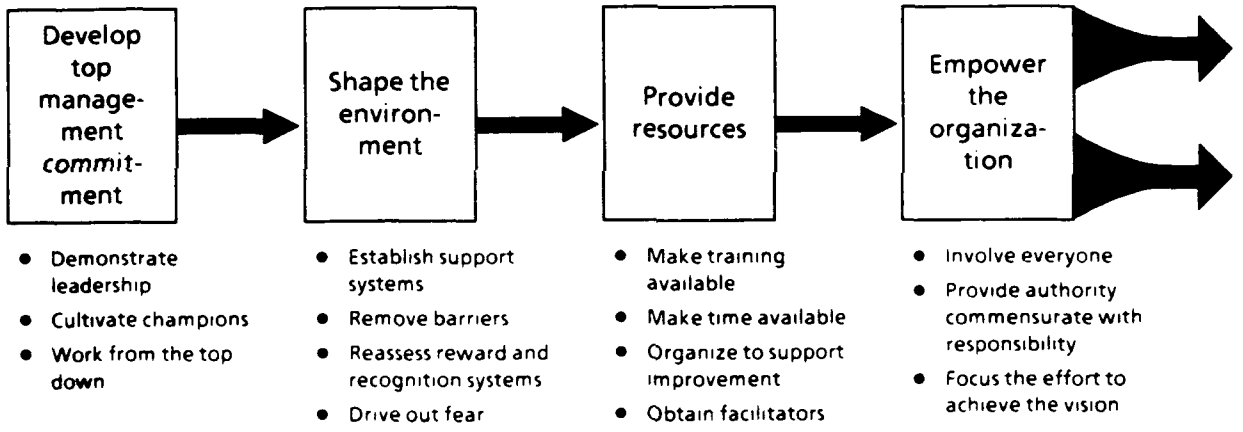


FIG. A-9. ENABLING

Focusing

Focusing the improvement effort, as shown in Figure A-10, turns the philosophy and the broad goals into specific objectives and plans for improvement. These goals, objectives, and plans are communicated throughout your organization. Your effort to focus TQM implementation must ensure that your organization establishes broad, top-level goals and then aligns all improvement efforts with those goals. Policy deployment translates broad goals into more specific, relevant goals at each organizational level. Goals at all levels must be realistic, achievable, relevant to both the group and the individual, and consistent. Involving customers and

suppliers ensures that common concerns are addressed; that you, your customers, and your suppliers understand each other's needs; and that information is exchanged in a timely and meaningful manner.

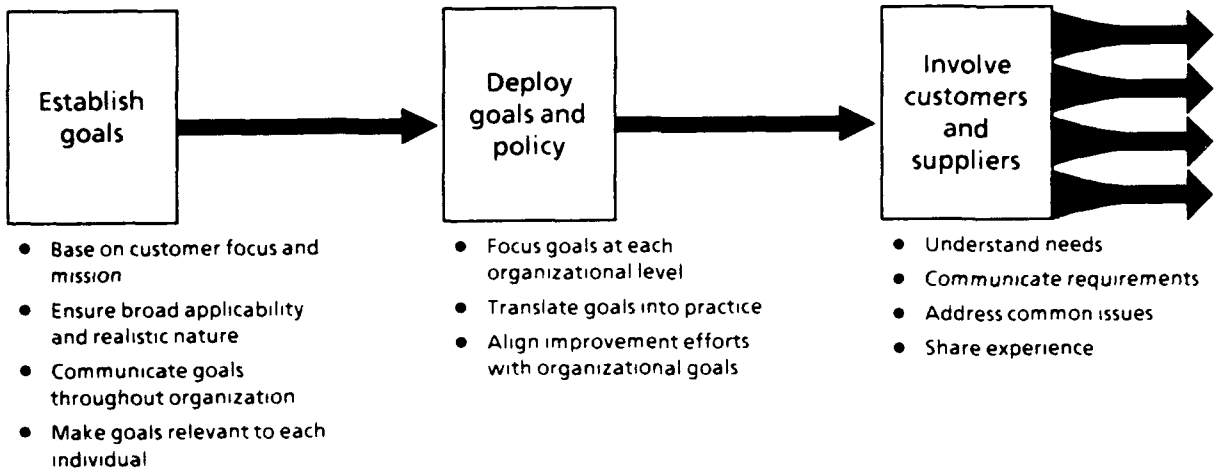


FIG. A-10. FOCUSING

Improving

Improving your processes, illustrated in Figure A-11, is the result of envisioning a new way of doing business, enabling that vision, and focusing the effort to achieve specific goals and objectives. Your organization's improvement activities include many of the more mechanical processes to define and standardize processes, to assess performance, and to improve your processes. Performance and progress measurement are a critical element throughout the continuous improvement process. The overriding characteristic of the improvement process is the establishment of and adherence to a structured, disciplined process-improvement methodology that allows you to take maximum advantage of your individual and collective experience and energy and to institutionalize that advantage for the good of the organization.

Learning

Learning, as shown in Figure A-12, is one of the fundamental elements supporting your TQM effort. It comprises training and education. In brief, your learning objective should be to provide each individual and group exactly the right amount of the correct education and training at just the right time. Doing this requires you to identify your projected needs from awareness through specific technical skills. You must also determine how the education and training will be

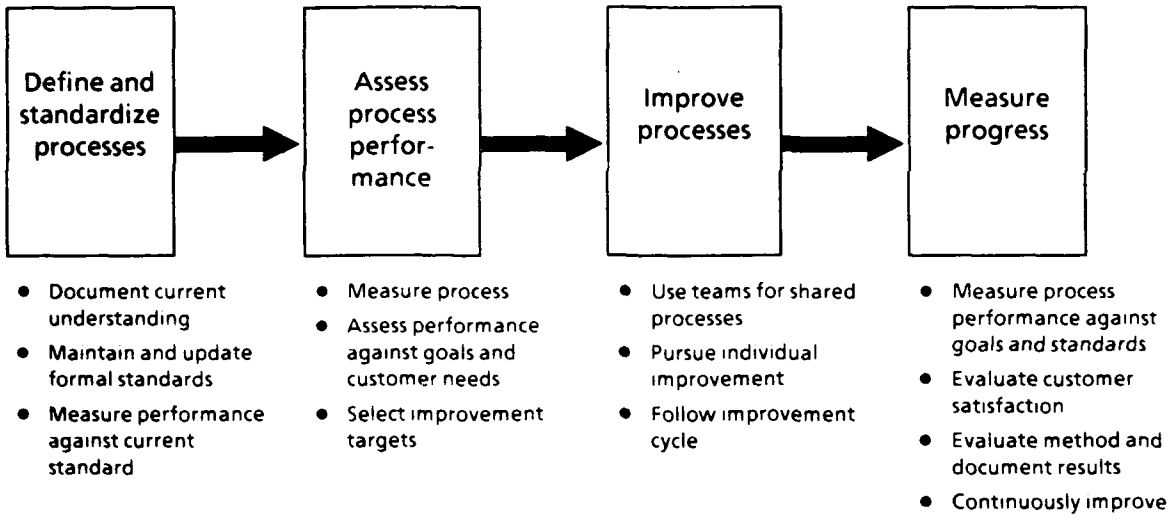


FIG. A-11. IMPROVING

delivered – in a classroom, on the job, or through self-study – and obtain the necessary materials and resources. You should plan learning so that each person and group will be able to use that new knowledge almost immediately after it is acquired. If the learning is not used right away, most people will forget it rather quickly and you will have wasted this valuable resource. Learning is necessary through each of the four phases of the LMI CIP Transformation Model, in different amounts of different subjects at different times for different people.

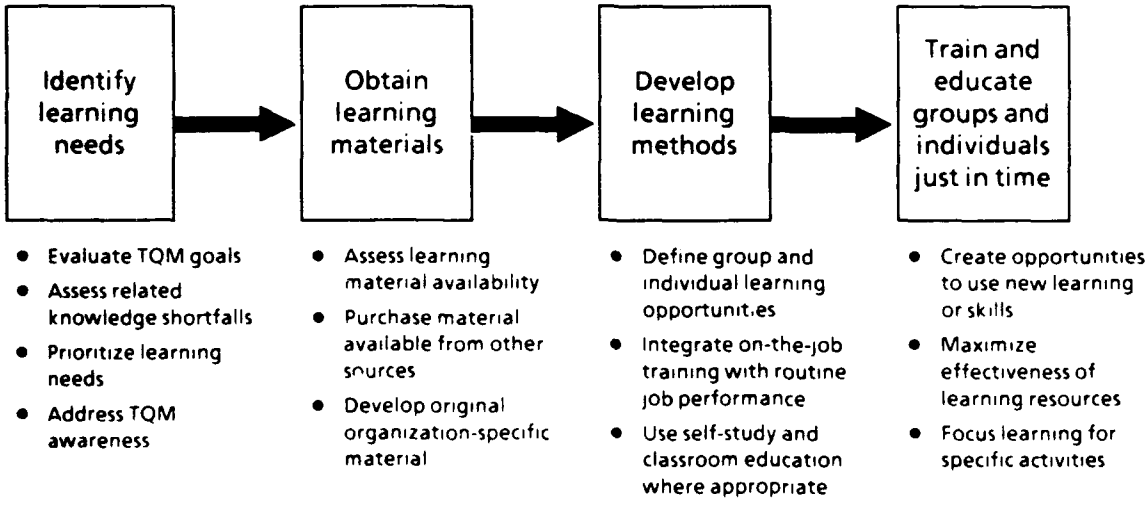


FIG. A-12. LEARNING

Team Building

Team building, depicted in Figure A-13, is the other fundamental element that will support your TQM effort. TQM will gain much of its power and momentum through the formation and activity of teams at all levels in your organization. You should form teams according to your overall organizational goals and ensure that teams have the necessary training and time resources to work effectively. Team building begins with the establishment of the ESC and continues through all levels to the bottom of the organization. In many cases team building simply means training existing work groups to act as teams; in other situations you may address common problems and concerns through creating cross-functional teams, sometimes coordinated by QMBs, that will draw participants from all interested areas. All teams should be linked, horizontally and vertically, and should follow the structured process-improvement cycle within the framework of the common organizational goals.

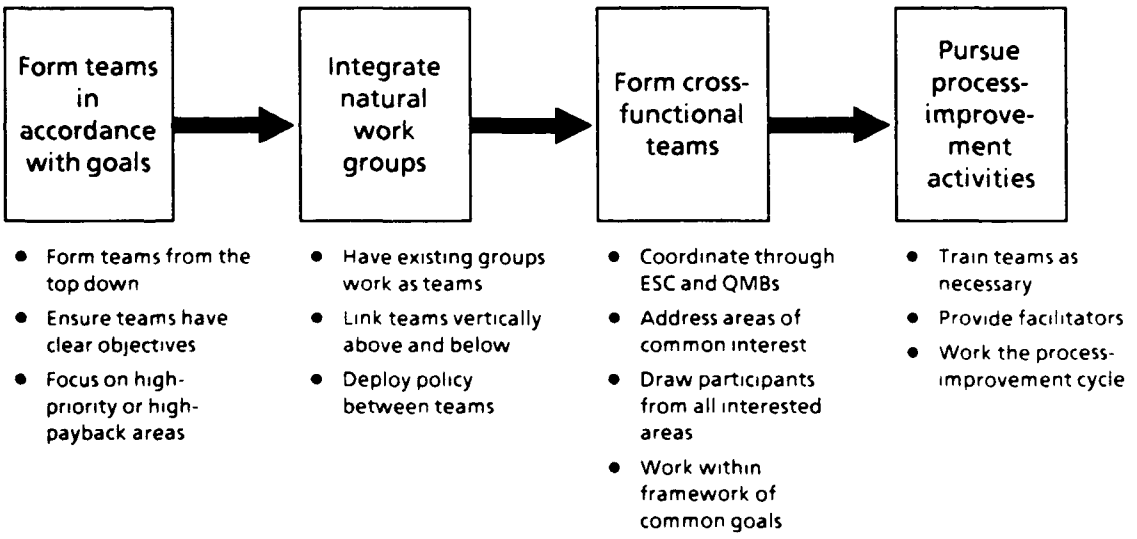


FIG. A-13. TEAM BUILDING

PROCESS-IMPROVEMENT MODELS

Moen and Nolan Strategy for Process Improvement

The Moen and Nolan Strategy for Process Improvement, shown in Figure A-14, is an 11-step strategy centered on the classic Shewhart or *Plan-Do-Check-Act* (PDCA) improvement cycle as are the remaining two process-improvement models. Its 11 steps start with selecting a process to improve and result in implementing a continuous-improvement cycle operating on the process. The model looks at an organization as a network of linked processes run by internal producers and customers. The ultimate output of the network is the product or service provided to an external customer. Each step of the model is briefly described below.[17]

Step 1: Determine Team Objective

You should identify a process that will have the greatest effect on improving customer satisfaction. The team chosen to work on improving a process should include people working in the process, people in authority to change the process, upstream suppliers, downstream customers, and related experts. The team must start off with a clear statement of the objective they hope to achieve. Each member of the team should see the accomplishment of this objective as important and worth working for.

Step 2: Describe the Process

Once the team has determined and agreed upon its objective, it should describe and document the process it intends to improve. The documentation should identify all process stages, inputs, and outputs. Complete documentation will identify all process suppliers and customers as well and will attempt to define customer needs and requirements.

Step 3: Flow Chart the Process

One key element of describing a process is creating a flow chart that documents the important stages in the process and identifies relationships between suppliers and customers. The flow chart demonstrates visually the flow of the process over

[17]A more-detailed discussion is provided in Moen, Ronald D. Ibid.

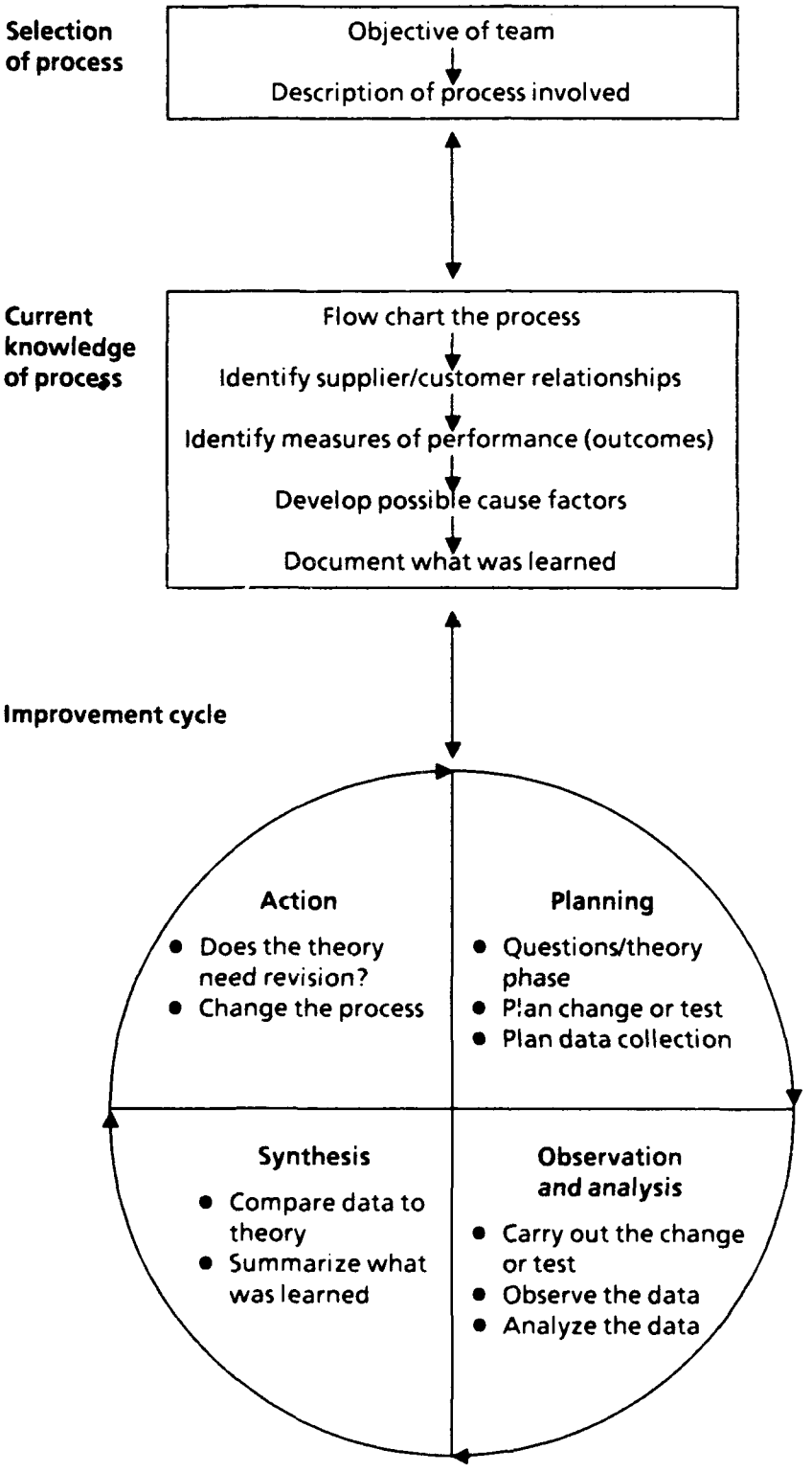


FIG. A-14. MOEN AND NOLAN STRATEGY FOR PROCESS IMPROVEMENT

time. Flow charts work best when simple, including only enough detail to give a basic understanding of what is happening.

Step 4: Identify Supplier / Customer Relationships

Quality and productivity are improved as producers work in teams with their suppliers (internal and external) to improve internal customer satisfaction and hence external customer satisfaction. Suppliers' targets serve as surrogates for customer needs. Each customer becomes the supplier for subsequent needs. Customer and process feedback provide a basis for the improvement action and for measuring subsequent performance.

Step 5: Identify Measures of Performance

Once the team agrees on the flow of the process, it must identify basic measures of performance for the outcome of each stage. These measures are identified as checkpoints on the flow chart. Each measure must be clearly defined as to what is specifically being measured and more importantly what those measures mean. Identifying performance measures creates windows through which you can observe your processes. If those windows do not provide predictable, consistent views of the processes, you will not be able to make intelligent decisions about how to improve the process.

Step 6: Develop Possible Cause Factors

Measurements provide key indications of process performance problems and their causes. You can use a number of tools to keep track of and assess these possible cause factors, which will identify opportunities for improvement.

Step 7: Document What Was Learned

Strict, consistent documentation is essential to maintaining control over the improvement process. Once improvements have been implemented, you must be able to maintain a history of the entire improvement effort. This history serves to provide lessons which might be applied to others in your organization and also will leave you a data trail with which you may analyze the success or failure of your improvement efforts.

Step 8: Plan

Once a project has been selected, the theory phase of the planning step begins. Theory may range from a hunch or "gut feeling" to well-accepted scientific principles at various times throughout the cycle. The next phase is to plan data collection. Data will be used to increase process knowledge and will help establish a consensus among team members. The questions to be answered by the data will guide the data collection process.

Step 9: Observe and Analyze

The observation phase begins when the plan for data collection is put in place. The data should be observed as soon as they become available. Any data collection process has many opportunities for error and many opportunities for special causes to occur. Plotting the data chronologically as they are obtained is vital for recognizing problems.

Once the data are obtained, they are analyzed to help answer the questions posed in the theory phase. In preparing for this analysis the team should determine the resources needed. Most data from well-planned studies can be analyzed using simple graphical methods, but there may be occasions when computers are needed. Most teams should quickly learn to use simple tools to collect and display their data. They will usually be able to analyze their own data, but there will be times when help from a statistician or other expert is needed.

Step 10: Synthesize

This phase brings together the results of the data analysis and the existing knowledge of the process. The theory is modified if the data contradict certain beliefs about the process. If the data confirm the existing theory about the process, then the team will be confident that the theory provides sufficient basis for action on the process.

Step 11: Act

Do we make a change in the process or go through the cycle without making a change? If a change is made, will it affect people? What other impact would a change in the process have? These questions and others may be answered by the data collected during the improvement cycle and subsequent analysis. Depending on the

answers, process modification may or may not be in order. There is no unique route to problem solving. Agreement on the suitability of improvement action is obtained by repeating the improvement cycle; it is the repeated use of the cycle that is important.

NPRDC TQM Process-Improvement Model

The NPRDC TQM Process-Improvement Model shown in Figure A-15 is also a PDCA-based model. It begins by stating a goal for improving a process and proceeds through institutionalizing successful process changes in documented process standards. Each step is briefly described below.[18]

Step 1: Plan

During the *Plan* phase you select the process you wish to improve and you state your goals for that process. Defining those broad goals further, however, requires you to describe your process flow by charting the flow itself, documenting your current understanding of how the process functions, defining the customers of the process, and understanding customer needs and requirements. Once you understand the process, you should make your improvement goals more specific, defining actual desired changes in process outcomes. These changes should be realistic, achievable, and measurable.

Step 2: Do

The *Do* phase is where you emplace the structure that will enable you to improve your process. You should identify the elements of your process, both internal and external, that potentially have an effect on the quality of your process and its products. To verify your theoretical causes of quality, you need to identify measures of your process's performance. In defining measurement points, ensure that they are specific, repetitive, and consistent. Before obtaining measurement data you should establish clear, concise data collection procedures to ensure that data are collected periodically and consistently.

Step 3: Check

You need to *Check* its performance to ensure that you accurately understand your process and more importantly to improve that process. Collecting and analyzing

[18]More-detailed information is provided in Dockstader, S. L. Ibid.

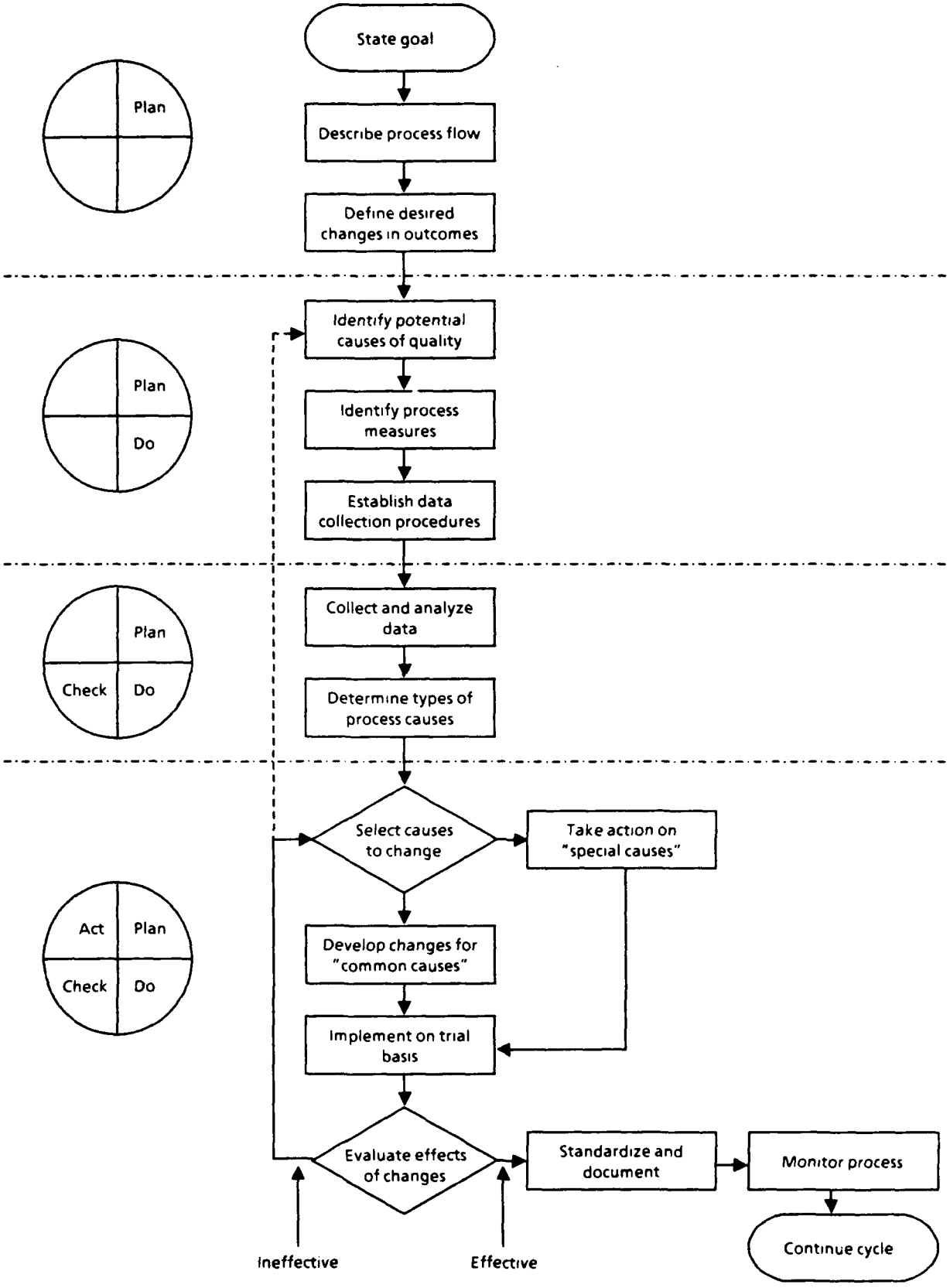


FIG. A-15. NPRDC TQM PROCESS-IMPROVEMENT MODEL

data is your primary tool for doing this. Data collection must be focused and consistent, performed in accordance with the procedures you established in the *Do* phase. You should analyze your data aggressively and thoroughly, looking to confirm your initial hypotheses or to identify new causes of performance problems. You should look for two types of problem causes – special and common causes. Special causes are those sources of variation or problem performance that are not endemic in the system itself but rather are the result of a specific error in process input or process operation. Common causes, on the other hand, are those that arise from the system itself and influence overall performance in a statistically predictable fashion.

Step 4: Act

Finally, it is time to *Act*. In this phase, you select the causes you want to change, taking one-time action on special causes, and developing remedial changes for common causes. You should implement both types of actions on a trial basis, evaluating their effects. For ineffective changes, you may have to go back and identify new causes of poor quality or causes of performance problems. You should document effective changes and build them into the normal way of performing the process. This usually entails the modification of existing process standards. Finally, you must set in place a means of monitoring process performance over the long term and ensuring both that your changes continue to have their desired effect and that people are performing the process according to the new standard. The process-improvement cycle continues forever, without end.

FPL Improvement Opportunity Process Model

The FPL Improvement Opportunity Process Model, shown in Figure A-16, is a seven-step process which follows the fundamental logic of the PDCA cycle. It provides a structured way for teams to identify improvement opportunities and solve problems. It begins with identifying opportunities for improvement and ends with tracking the effectiveness of implemented solutions. Each step is briefly described below.[19]

[19]More-detailed information is provided in *FPL Quality Improvement Team Guidebook*, Ibid.

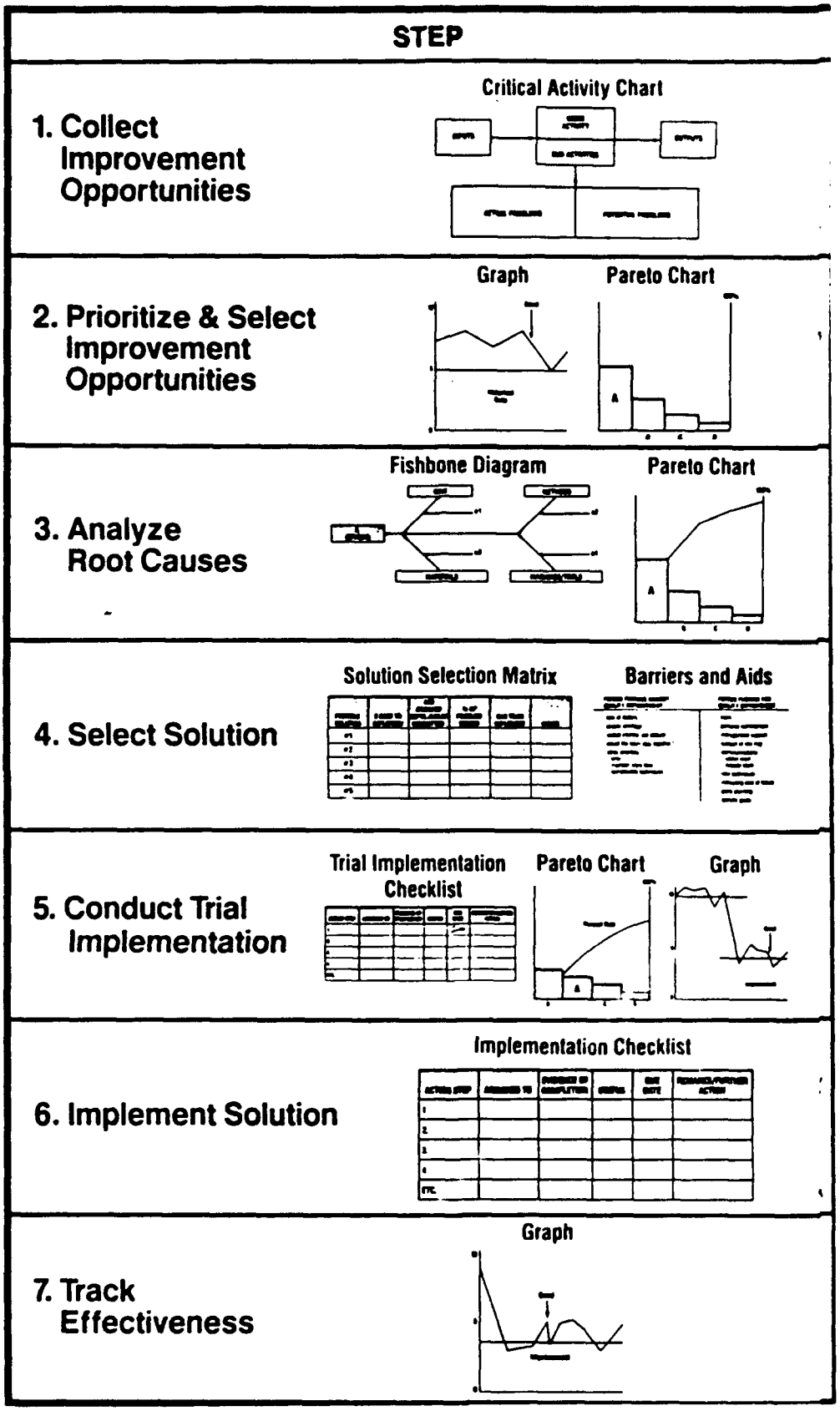


FIG. A-16. FPL IMPROVEMENT OPPORTUNITY PROCESS MODEL

Step 1: Collect Improvement Opportunities

Before beginning the improvement effort, you should identify the most promising opportunities for improvement. This requires collecting all possible improvement opportunities. Through suggestion programs, critical activity charts, brainstorming, and thorough interviewing, you may identify a number of opportunities for improvement Ideas may also be generated by current organizational performance or by policy deployment plans that lay out organizational goals and objectives.

Step 2: Prioritize and Select Improvement Opportunities

Once improvement opportunities have been identified, their priorities must be established so that the opportunity with the greatest potential for improvement or the largest potential benefit is selected. Key considerations in prioritizing and selecting problems include how the problems relate to daily work; their potential impact internally and on your customers; and the demonstrated need for improvement. You should write clear problem statements, establish valid requirements, and develop a desired goal. You may select from a number of statistical and group interaction techniques in selecting problems for improvement.

Step 3: Analyze Root Causes

Selecting your problem is only the beginning of the improvement effort. Identifying and verifying the most significant root cause(s) of the problem is the next key step in addressing it. Root causes will point to the improvements you will make in your process. You should keep asking why things happen and ensure you are identifying causes instead of symptoms. Once you have identified a number of causes, you narrow them down to the most significant ones, which you analyze using quality control tools.

Step 4: Select Solution

Root causes will themselves suggest different means of resolving your problem. In addition to the obvious solutions, however, you and your team should pursue less-evident solutions that may be even more suitable. You should also attempt to select solutions that address as many root causes as possible. Other things to consider include how the solutions will affect your customers and the people actually working

with the affected process, whether or not the team can actually implement the solution, and the resources needed to accomplish the improvement.

Step 5: Conduct Trial Implementation

After selecting its preferred solution, your team should plan and conduct a trial implementation. You will need to develop an action plan that addresses all aspects of the proposed change and assign responsibility for individual action items. The planning activity includes notifying and obtaining approval from appropriate management personnel. You should ensure a methodical approach to your trial so that improved performance is clearly documented and may be used to justify making the improvement permanent.

Step 6: Implement Solution

Once a trial implementation proves the viability of your chosen solution, you should quickly move to ensure the solution becomes part of your daily work process and that it is properly documented. Presentations to management may be appropriate, using the results of the trial implementation to justify final approval. You should put together a quality improvement story that traces the improvement from its initial identification and justification to its actual performance. Finally, you will have to modify procedures and standards to ensure your solution is made permanent.

Step 7: Track Effectiveness

Implementing the solution is near the end of the improvement cycle, but you must continue monitoring the solution to ensure it remains effective. The team may assign individuals to follow up on the improvement periodically. Any discrepancies or degradations in performance should be immediately addressed by the team as part of the ongoing quality improvement effort. Tracking the effectiveness of improvement efforts should as much as possible be part of ongoing measurement and evaluation efforts.

Joiner Associates' Model of Progress

The Joiner Associates Model of Progress, shown in Figure A-17, is a six-step process that includes an additional five-stage plan for process improvement. The overall model shows the general progression of events in project teams. It begins by

establishing a clear goal based on the organization's mission statement and proceeds through evaluation and management recognition of completed team improvement projects. Each step is briefly described below.[20]

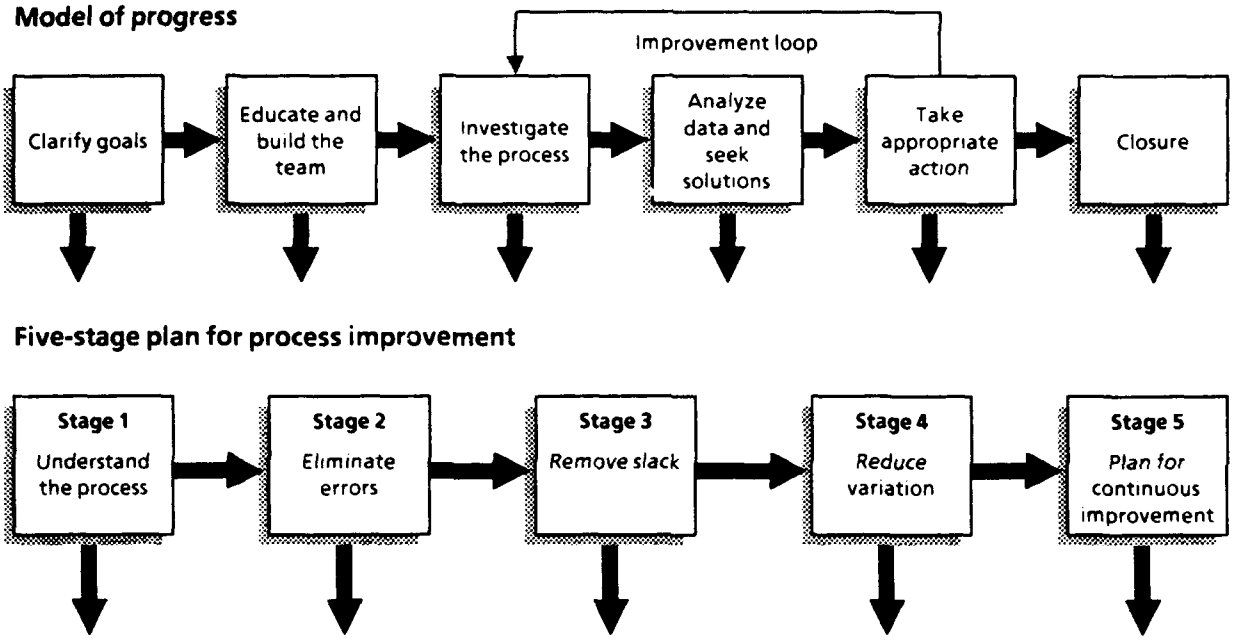


FIG. A-17. JOINER ASSOCIATES' MODEL OF PROGRESS

Model of Progress

Step 1: Clarify Goals. Before the team is even completely constructed, team members begin discussing their mission. They should understand what it means to be on the team, what process they will work on, and what kinds of improvements are expected. From these goals and expectations they will draft an improvement plan that will guide all subsequent team activities.

Step 2: Educate and Build the Team. The first few team meetings are typically devoted largely to team building and education. Team building includes setting the ground rules for team interaction and the logistics for the team's operation. The team should discuss its particular quality issues. The team proceeds with general discussion of the overall quality philosophy and education and training in specific quality improvement tools and techniques. In addition to developing the technical

[20]More-detailed information is provided in Scholtes, Peter R. Ibid.

expertise necessary to improve its processes, the team must take ownership of the process and perceive that process improvement is important.

Step 3: Investigate the Process. After team members have been exposed to quality and scientific principles, and have been trained in technical improvement methods, they are ready to begin work in earnest on the process. They begin by studying the process to learn more about how it operates and to identify problems. Process investigation includes documenting the process by using flow charts and diagrams, identifying and communicating with customers, and collecting process data. Process data yield clues to root causes of the problems, which point to additional data needs.

Step 4: Analyze Data and Seek Solutions. Once you collect the necessary data, your team should analyze them to identify possible causes of problems and then determine which of those possible causes are actually root causes. The five-stage plan for process improvement, described below, helps the team analyze root causes and develop appropriate, permanent solutions to the problems.

Step 5: Take Appropriate Action. Once potential solutions have been identified, you should develop a strategic plan to test the proposed solutions. Implementing the test involves gathering data on the changed process, analyzing that data, and redesigning the improvements if necessary. The results of the changes must be continually monitored, not only during the testing period but permanently. You should establish a system with which to monitor improvements as part of the normal way of doing business.

Step 6: Closure. Closure involves presenting the improvement project to management and other interested people in your organization. It is a means of allowing others to take advantage of your lessons learned and of providing your team recognition for their efforts. During closure you will also evaluate the results of your team's improvement effort and your team's performance during that effort. Finally, you should complete documentation of your project.

Plan for Process Improvement

Stage 1: Understand the Process. Before your team can make improvements, each member must thoroughly understand the process. To really know what is right and what is wrong with a process, you must answer three questions: How does the

process currently work? What is it supposed to accomplish? What is the current best-known way to carry out the process? Investigating these questions is the best way for your team to gather information that will let you set goals and objectives for the rest of the improvement project. Understanding a process is achieved through describing the process, identifying customer needs and concerns, and developing a standard process.

Stage 2: Eliminate Errors. Everyone makes mistakes. Yet we fail to realize that many mistakes can be prevented by making simple changes to a process. For instance, if people forget to fill in a certain blank on a form or to add the right number of components to a kit, make changes that either highlight the needed step or stop the process until a step is completed. Through actions such as these you will be able to "error-proof" your processes.

Stage 3: Remove Slack. Increasing numbers of organizations are realizing that traditional practices of keeping huge inventories and doing work in large batches are more harmful than helpful. These now-standard practices mask problems instead of solving them. In addition, processes tend to grow over the years, many steps losing whatever value they once had.

To get out of this trap, move toward "just-in-time" flow and examine each step to see if it is necessary and adds value to the product or service. The result of this critical examination is often dramatically reduced time required to complete a process. The resulting improvements usually increase quality, too.

Stage 4: Reduce Variation. The sources of variation come from both common and special causes; the key is to tell them apart. Common causes typically come from numerous, ever-present sources of slight variation. Special causes, in contrast, are not always present, and usually create greater fluctuations in the process. Eliminating common causes requires fundamental changes in how a process is performed; special causes can often be taken care of through relatively simple changes. You should first focus on reducing sources of variation on your measurement processes and bringing those processes under control and then performing the same sequence on your targeted processes.

Stage 5: Plan for Continuous Improvement. By this stage, the most obvious sources of problems will have been eliminated from the process. Now your team must look for ways to make improvement a constant, never-ending part of the process and

your jobs. Ongoing training and education in areas related to the process and instruction in the skills associated with statistical tools are critical. Before bringing the project to a close, discuss ways to keep the improvement philosophy alive. Keep records about the process and procedures up to date; make sure they are used.

LMI CIP Process-Improvement Model

The LMI CIP Process-Improvement Model, shown in Figure A-18, incorporates the PDCA approach but also addresses the need to standardize processes and maintain comprehensive, up-to-date process standards. It begins with the activities needed to create an environment conducive to continuous process improvement, follows that with selecting and improving a process, and finally assesses the level of performance improvement; the model then cycles around to focus on another process-improvement effort. This model flows logically from the LMI CIP Transformation Model (see Figure A-7). Each step is briefly described below.[21]

Step 1: Set the Stage for Process Improvement

At the organizational level, setting the stage for process improvement involves everything your organization does to become aware of the need for improvement and to establish a commitment to continuous improvement. It includes basic education and training, goal setting, barrier reduction, and leadership. Setting the stage means your organization must create an environment in which process improvement activities are encouraged and nourished. Your organization must have a clear vision of what it wants to accomplish and where it wants to go, and it must lay in place support systems to help the improvement effort.

At the team and the individual levels, setting the stage involves selecting and educating the team or individuals, and training them in the specific concepts, tools, and techniques they will require for the contemplated improvement effort. They should determine how they will function in the overall organizational environment and ensure that all individuals have enlisted themselves in the accomplishment of their perceived mission.

[21]The model is discussed in more detail in Mansir, Brian E. Ibid.

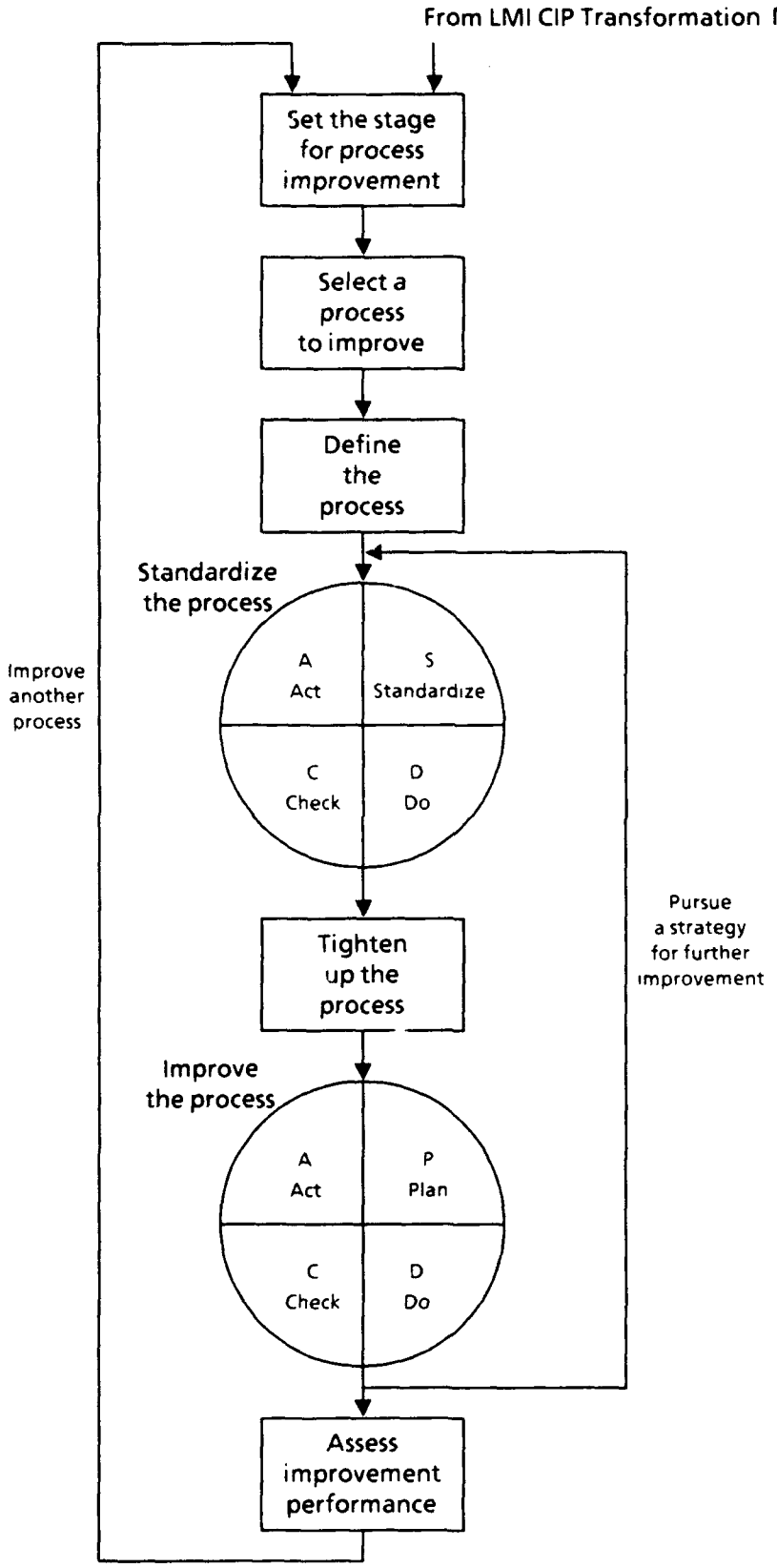


FIG. A-18. LMI CIP PROCESS-IMPROVEMENT MODEL

Step 2: Select a Process to Improve

Your team must identify, from all the potential candidates and in conjunction with organizational and team objectives, one process on which they will focus for each pass through the improvement cycle. Selecting the improvement target involves identifying all the potential opportunities, prioritizing them, and choosing the process that currently presents the biggest problem or the greatest opportunity for improvement. Once selected, the team must identify the major problems and isolate their root causes. From this background work, the team may create a plan for improvement that builds on the team's objectives. Identifying measurement points is also necessary before beginning the process improvement effort.

Step 3: Define the Process

Once a process has been targeted for improvement, you should define that process as clearly and completely as possible. Process definition involves determining the customers (both internal and external) and the suppliers of the process, documenting how the process is currently performed (usually through using a flow chart or diagram), and identifying measures of process performance. Documentation should be formal and consistent among all organizational processes. A firm process definition provides you a consistent base from which to begin process improvement; without knowing where you are at a given moment, it is hard to determine how to get to your destination.

Step 4: Standardize the Process

By standardizing a process, you institutionalize the current best way to perform that process. You create a means of instructing people in their jobs within a consistent performance definition, you provide a means of evaluating performance consistently, and you provide a basis for evaluating the success of your improvement efforts. You may accomplish all this by following the *Standardize-Do-Check-Act* (SDCA) cycle, which initially requires you to bring your measurement systems under control, to identify and document your current method of performing the process (which becomes the process standard), and to communicate and promote use of the standard. You train people to the standard, enable its use, and enforce that use. Once the standard is in force you should measure all process performance against that standard and respond appropriately to deviations from it. Reducing performance variation by assessing the causes of deviation and eliminating them

allows you to prevent recurrent deviation. The standard should always reflect the best current way of performing the process.

Step 5: Tighten Up the Process

Once you have defined a process standard you should tighten up the process before actually attempting to improve it. Tightening up is the maintenance work you can do that will make your process improvement efforts as effective as possible. Ensuring that your process meets its stated and perceived requirements, cleaning and straightening the process work areas, eliminating unnecessary equipment, instituting total productive maintenance, and establishing reliable, adequate data collection systems are essential elements of this effort to tighten up the process.

Step 6: Improve the Process

Your efforts to improve the process should follow the classic PDCA cycle in which you plan for improvement, implement solutions, check for improvement, and act to institutionalize improvements. Your effort will involve developing solutions that address stated requirements and conform to your theories on problem causes. Your data collection and measurement methodologies must support whatever solution you envision. Your team must be trained in the techniques necessary to carry out the plan. After you carry out your planned improvement, you should assess your data to determine how well actual performance matches planned improvements. Successful improvements should be institutionalized; less-than-successful efforts require another pass through the improvement cycle.

Step 7: Assess Improvement Performance

After an improvement has been implemented, you should document improved performance and the successful improvement effort thoroughly. This documentation allows others to benefit from the lessons your team has learned and gains you recognition for your efforts. It also provides a road map so you may replicate successful improvement techniques. Documenting your improved process also requires you to update your process definition and flow diagrams and requires that process standards be rewritten to reflect the new standard of performance. You should set in place a means of continuously measuring performance levels if this system does not already exist. Recommending follow-up actions or subsequent improvement efforts is also appropriate. Finally, celebrate your effort!

INDIVIDUAL IMPROVEMENT MODELS

PMI Leadership Expectation Setting Model

The PMI Leadership Expectation Setting (L.E.S.) Model, shown in Figure A-19, revolves around continuous improvement of "quality indicators" or the factors that are truly critical to success. Its primary expectation is continuous improvement of processes and systems within the employee's own function. Leaders and co-workers participate and are expected to provide constructive help and support. L.E.S. is predicated on the belief that you and every other individual in your organization are leaders just as much as top management. L.E.S. comprises eight main steps, which are briefly described below.[22]

Step 1: Develop a Mission Statement

The first step is to develop your own mission statement which is consistent with the mission of your entire organization. Make it explicit, but remember that it is to be a guideline for future decision making. As a leader, your vision and mission must be able to be understood by all those you influence in your organization. A vision understood only by you will not move others. You must cultivate a feeling of employee ownership in the organization's future.

Step 2: Identify Key Leadership Functions

Your main improvement priority should be to focus process-improvement efforts on your highest priority functions. To do this you identify the responsibilities of your job which have the greatest effects on your group's results. From this identification you determine specific opportunities for improvement in your leadership processes.

Step 3: Identify Improvement Opportunities

In identifying improvement opportunities, you first need to understand what your major job functions and tasks are. You focus on your customers, determining their requirements and priorities and using those requirements to focus your own improvement efforts. Finally, you must identify factors that indicate the level of

[22]They are discussed in more detail in Schultz, Louis E. *L.E.S. Management.* Ibid.

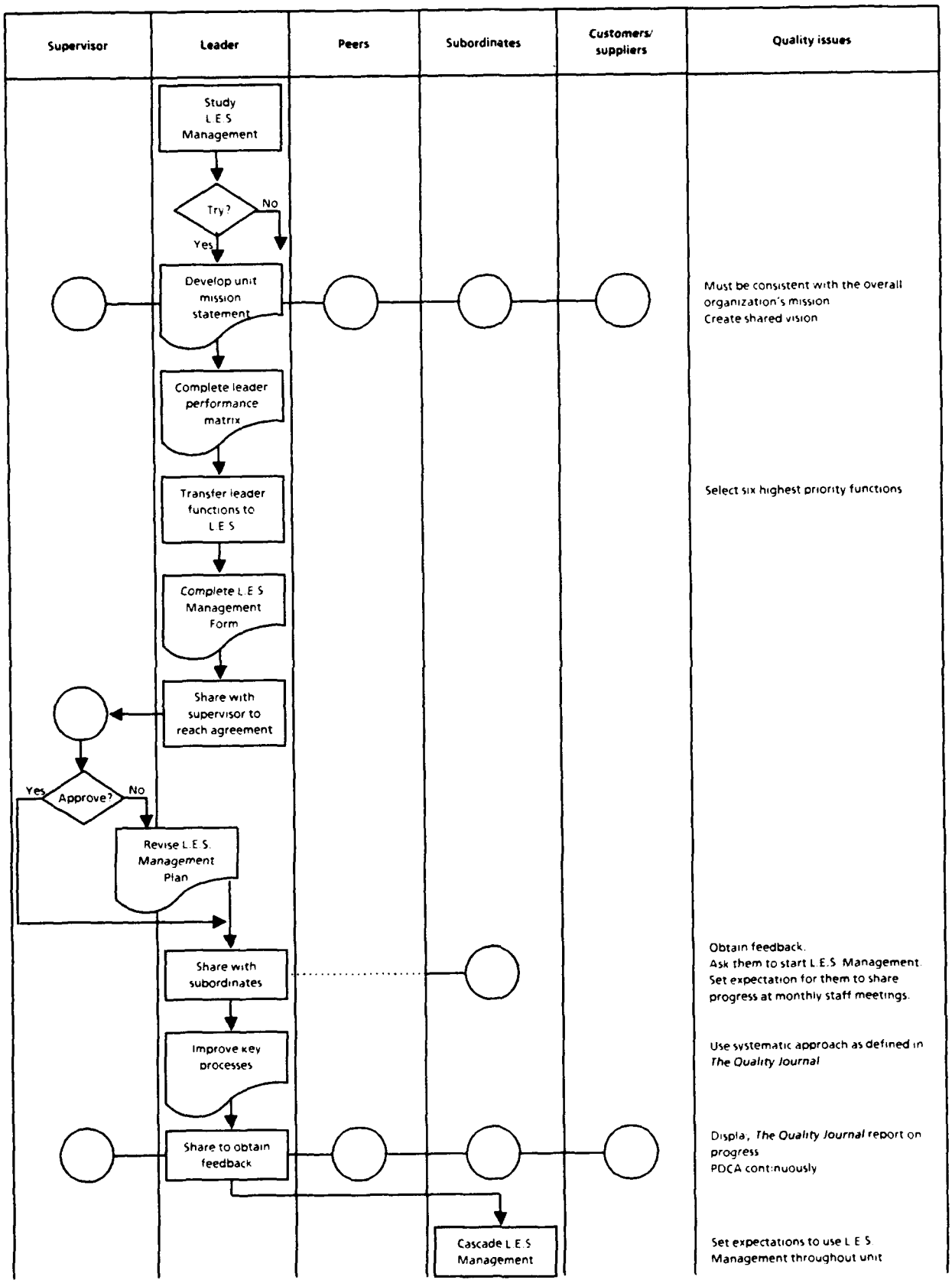


FIG. A-19. PMI LEADERSHIP EXPECTATION SETTING MODEL

quality in your work – how will you establish the basis for improvement and measure the level of improvement you achieve?

Step 4: Share Results with Supervisor

You must discuss your personal-improvement plan with your supervisor to ensure it is meaningful to the organization as a whole and that it contributes to overall organizational goals. Your supervisor should agree with your proposed plan for improvement and should provide comments on your approach where appropriate. Since the time and resources available to you for your own improvement depend to a large extent on your supervisor's support, it is essential for you to obtain his/her agreement before proceeding.

Step 5: Share the L.E.S. Plan with Subordinates

Leadership improvement is meaningless absent the context of those individuals being led. Your subordinates are the ultimate purpose of your improvement plan; in effect they are your major customer. You should share the plan with them and ask for their comments and perceptions. You should invite them, inasmuch as all individuals in the organizations are leaders, to begin the L.E.S. process themselves. You should encourage each individual to share his/her progress with the group.

Step 6: Use a Systematic Approach

To provide consistency to the improvement process, you should adopt a structured, systematic approach. Such an approach enables you and each person using the L.E.S. approach to display progress in a manner understandable by all. A disciplined method of defining a problem, observing it, determining its causes, taking action, checking the effectiveness of that action, standardizing the solution, and evaluating the process is a key to providing that consistency. Such a disciplined approach is outlined in the description of *The Quality Journal*, published by PMI, below.

Step 7: Share Progress

Leadership Expectation Setting is not only a model for individual improvement, it is also a basis for continuous performance communication and feedback between employees and supervisors. When you share progress, you should not focus on completing or updating forms, but you should rather engage in substantive

discussion of improvement objectives, obstacles to meeting those objectives, and lessons learned on the way. Often you will find that more important lessons are learned in failure than in success; therefore your performance assessment, both with your supervisor and with your subordinates, should focus on the underlying causes of failure instead of the fact of failure itself.

Step 8: Cascade L.E.S. Management Through the Organization

You should set the expectation that L.E.S. and individual improvement can be applied at any level in the organization. Your leadership and adherence to the process is crucial to its success in your organization however. You must demonstrate a belief in and commitment to the improvement process if you are to inspire its adoption by others.

The Quality Journal

The Quality Journal, shown in Figure A-20, is an adaptation of a Japanese discipline for problem solving. It brings consistency to problem solving in all areas of an organization and displays progress so that anyone can look at the problem-solving activities, understand progress, and offer additional suggestions for improvement. It is a means for documenting your individual improvement efforts. *The Quality Journal* displays a summary of activities that may be displayed in more detail by specific statistical tools. It basically encompasses the seven steps described briefly below.[23]

Step 1: Clearly Define the Problem

You should factually state the extent of the problem and how it impacts the total system. Then construct an integrated flow chart to graphically display the process. A problem statement documents in detail what is known about the problem. It explains the reason for selecting the problem, the background of the problem, and what has been done to date. An integrated flow chart is a means to examine the process to see what can be done to simplify it – remove complexity, redundancies, and unnecessary actions. The problem-solving effort should be planned, and schedules, time, and costs should be estimated.

[23]The seven steps are described in more detail in Schultz, Louis E. *The Quality Journal*. Ibid.

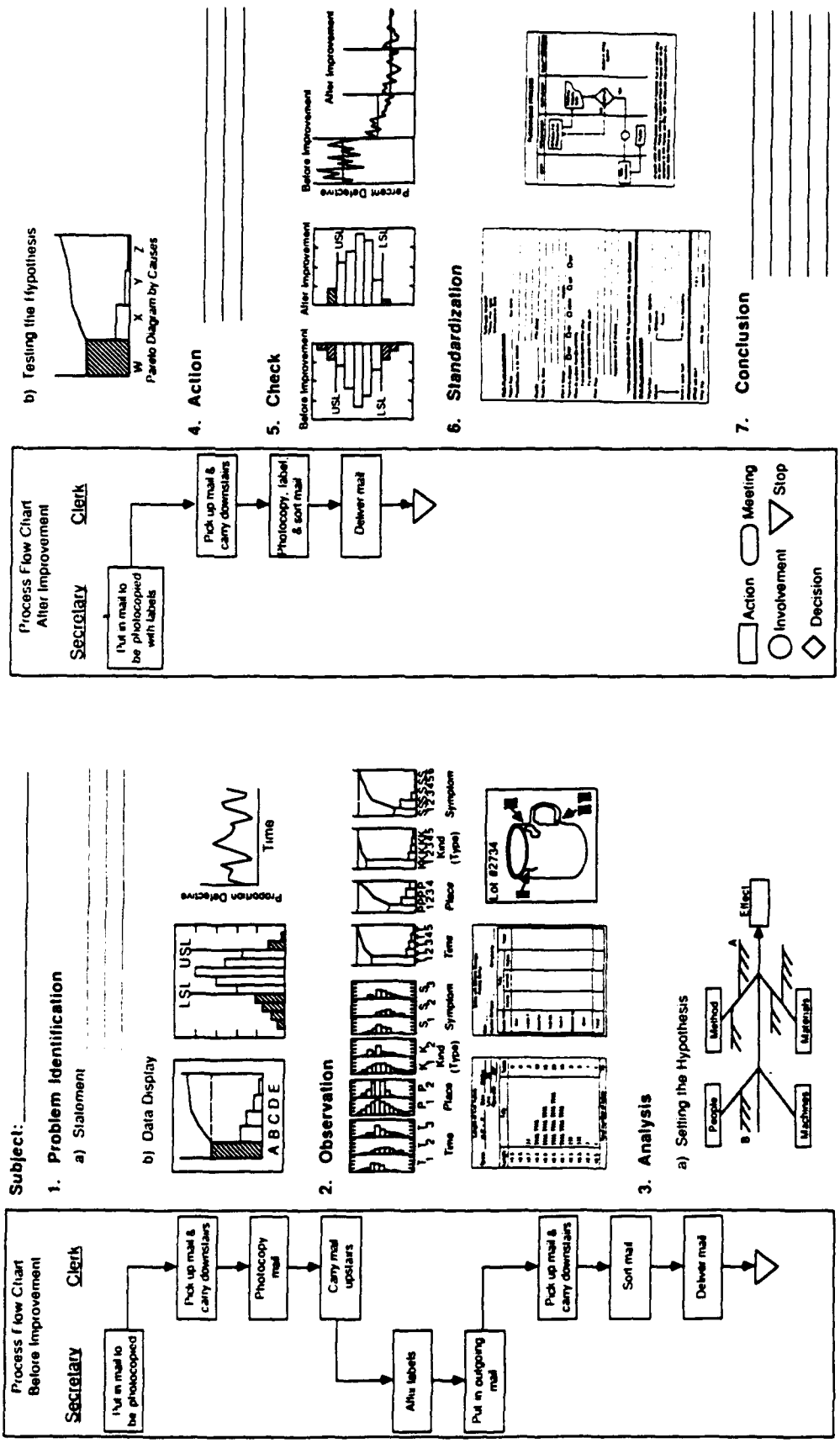


FIG. A-20. THE QUALITY JOURNAL

Step 2: Observe the Problem

You should examine your problem from several points of view, which might include different times, places, methods, and symptoms. Use specific, focused data collection methods to ensure consistent, accurate, useful data. Involving your employees in the data collection process can also help.

Step 3: Determine Causes

In determining the causes of your problem you should first hypothesize possible causes and then test those causes. You may identify possible causes according to main categories you establish for the problem. Causes that seem to make the highest contribution to the problem should be noted; information gained from the observation step will be helpful in making this determination. Collect new data to test your hypotheses and either prove or disprove them.

Step 4: Take Action to Eliminate Main Causes

Again, use your data to evaluate several different solutions to the main causes of the problem. Be careful that you are evaluating and removing root causes and not merely symptoms. You should also ensure that your solution does not have any detrimental side effects. Finally, select your solution and implement it.

Step 5: Check Your Solution

You must determine the effectiveness of your selected solution. Data are once again the key to this determination. Compare the situations before and after. If the results of the action are not what was desired, first determine if the action was implemented as planned. If so, but the results are undesirable, you will have to test a different solution.

Step 6: Standardize Successful Solutions

After the desired results are achieved, you should standardize your solution. This involves documenting the successful solution in a new process standard and communicating it to everyone involved in the process. Provide training to ensure the standard is correctly implemented, and devise a system of observing compliance with the new standard.

Step 7: Conclusion

Finally, review your problem-solving procedure and identify any lessons you learned about the improvement process itself. Note what worked well and what did not so that your future improvement efforts and those of others will be even better.

LMI CIP Personal-Improvement Model

The LMI CIP Personal-Improvement Model, illustrated in Figure A-21, follows the basic guidelines of the LMI CIP Transformation Model but applies those guidelines to individual-improvement efforts. It involves establishing a vision for your own improvement effort and enabling that effort; focusing your behavior and your expectations to achieve continuous improvement in your performance, your job, and the performance of others; and finally in evaluating your efforts to improve. Below is a brief discussion of the CIP improvement concepts.[24]

Step 1: Envision Personal Improvement

Before you can begin to improve you have to decide that there is a need for improvement and then determine the general emphasis of your improvement effort. You should build your own self-awareness of the need to improve and your individual ability to improve. Assessing your relationships within the organization and with your customers and your suppliers provides a fundamental understanding of the current status quo. From this assessment you will develop your expectations for your own behavior, and you can begin creating your personal vision for your improvement.

Step 2: Enable Personal Improvement

You must make your vision a reality and must begin by smoothing the road along which you will travel. This effort starts with educating yourself about your improvement goals and about TQM concepts, principles, and practices. Seek training for yourself in the skills and principles you see as essential to your effort. Enabling is a process of learning – learning about using TQM tools, about your processes, about the collection and use of data, and about the process of learning itself. You should also seek the support of others, not so much from the standpoint of gaining their approval as from the standpoint of cultivating their help in removing barriers to your effort.

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[24]Detialed information is provided in Mansir, Brian E. Ibid.

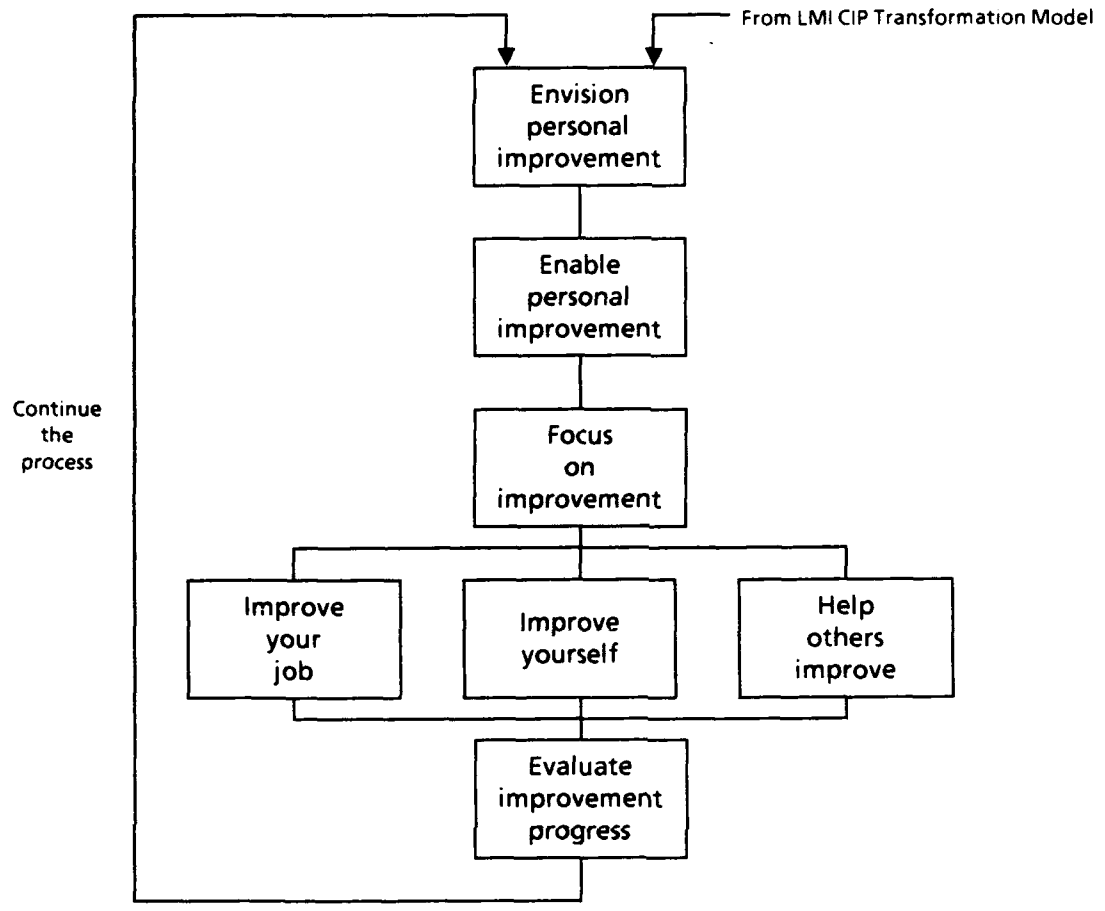


FIG. A-21. LMI CIP PERSONAL-IMPROVEMENT MODEL

Step 3: Focus on Improvement

You focus your improvement effort through establishing goals for that effort and then ensuring that your improvement activities are aligned with those overall goals. You should develop a cohesive improvement strategy to guide your efforts and ultimately use that strategy to evaluate the success of those efforts. Making improvement a high personal priority and creating time in your schedule for improvement activities are vital to this effort and are a clear demonstration to yourself and to others of your commitment to improvement.

Step 4: Improve Your Job

Your job may be defined as the collection of the processes you own. You should establish control over your job by defining your processes and understanding how those processes interrelate and relate to others, including your customers and your suppliers. By removing complexity from your processes and pursuing small, incremental improvements, you will substantially increase the effectiveness of your performance in your job, and you will greatly enhance your personal-improvement effort.

Step 5: Improve Yourself

You must demonstrate leadership in the improvement effort through your commitment to personal improvement. This means that you must establish and adhere to a structured, disciplined approach to improvement that clearly defines your goals and requires steady, consistent improvement performance. You should also facilitate communication between yourself and others, and among others. Remove the barriers you place in your own way, seek the assistance of others to remove the barriers you do not control, and work to eliminate your own fears of change and improvement. This is best done through education and through communication with others. Depend on your vision as your guide for improvement and use that vision to maintain your momentum.

Step 6: Help Others Improve

Through your improvement effort, you will help your organization as a whole improve. An essential part of your personal-improvement effort should be to help others improve themselves and the organization. By training and coaching others, by creating more leaders, by working to create teams and eliminate barriers, and by encouraging others' improvement activities, you will spread your own example and your enthusiasm throughout the organization. Personally you can make a substantial contribution to the individual-improvement efforts of others.

Step 7: Evaluate Your Improvement Progress

You must ascertain your success in your efforts to improve. By measuring your performance against an established base, by recognizing that the value of improvement lies in the effort to improve instead of the results, and by documenting your improvement efforts so they may be shared with and used by others, you will

derive the most from your own efforts. Celebrate your success and the success of others. Ensure through your evaluation that the improvement effort itself is rewarding and provides further incentive for continuous-improvement effort.

APPENDIX B

SEVEN BASIC GRAPHIC TOOLS

SEVEN BASIC GRAPHIC TOOLS

INTRODUCTION

Tools and techniques are essential to the continuous improvement process. Tools make it possible for you to accomplish work; make meaningful measurements; and analyze, visualize, and understand information. Techniques help you to organize and accomplish work in a structured and systematic manner. A great number of appropriate and useful tools and techniques are available for your continuous-improvement effort. Detailed information about many of those tools and techniques is contained in the Reference Material at the end of the main text of this guide. Seven tools, often called the seven basic graphic tools, are essential to any properly designed improvement effort: (1) flow charts and diagrams, (2) Pareto Charts, (3) cause-and-effect diagrams, (4) graphs, (5) control charts, (6) checksheets, and (7) scatter diagrams.

FLOW CHARTS AND DIAGRAMS

Flow charts permit you to examine and understand relationships in a process or project. They provide a step-by-step schematic or picture that serves to create a common language, ensure common understanding about sequence, and focus collective attention on shared concerns. Several different types of flow charts are particularly useful in the continuous improvement process. Three frequently used charts are the top-down flow chart, the detailed flow chart, and the work-flow diagram.

The top-down flow chart (Figure B-1) presents only the major or most fundamental steps in a process or project. It helps you or your team to easily visualize the process in a single, simple flow diagram. Key value-added actions associated with each major activity are listed below their respective flow diagram steps.

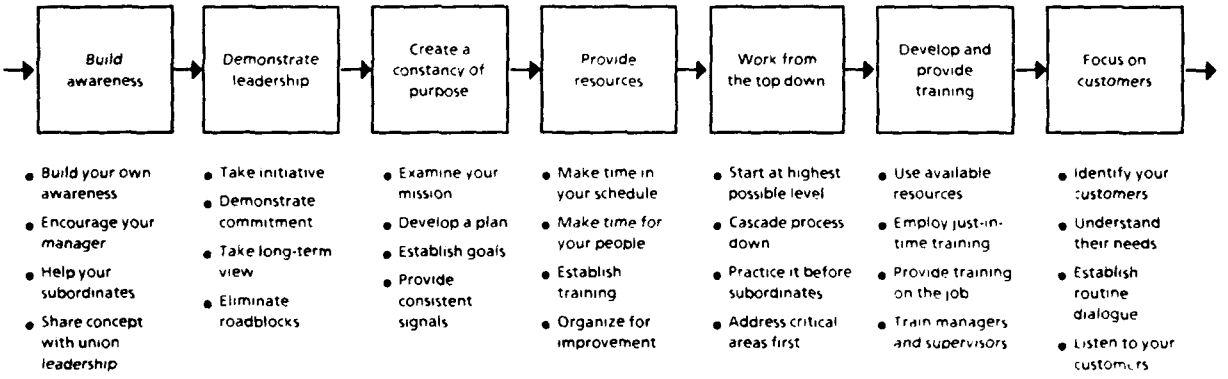


FIG. B-1. TOP-DOWN FLOW CHART

You can construct a top-down flow chart fairly quickly and easily. You generally do so before attempting to produce detailed flow charts for a process. By limiting the top-down flow chart to significant value-added activity, you reduce the likelihood of becoming bogged down in the detail.The detailed flow chart (Figure B-2) provides very specific information about process flow. At its most detailed level, every decision point, feedback loop, and process step is represented. Detailed flow charts should be used only when the level of detail provided by the top-down or other simpler flow charts is insufficient to support understanding, analysis, and improvement activity. The detailed flow chart may also be useful and appropriate for critical processes where precisely following a specific procedure is essential. The work-flow diagram (Figure B-3) is a graphic representation or picture of how work

actually flows through a physical space or facility. It is very useful for analyzing flow processes, illustrating flow inefficiency, and planning process flow improvement.

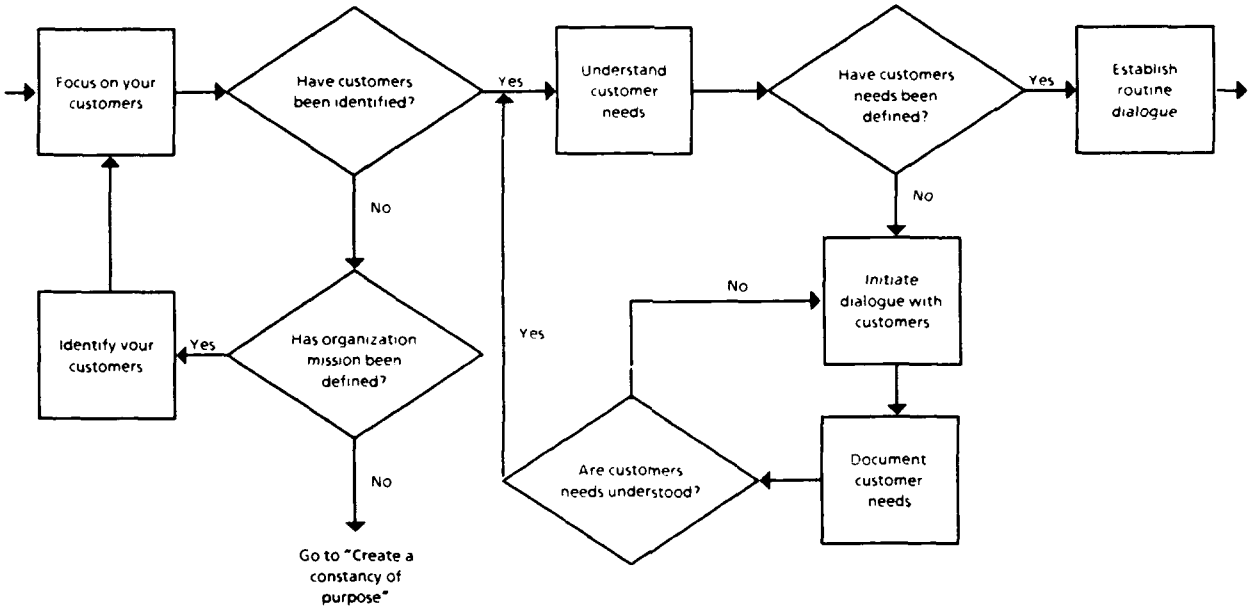


FIG. B-2. SAMPLE DETAILED FLOW CHART

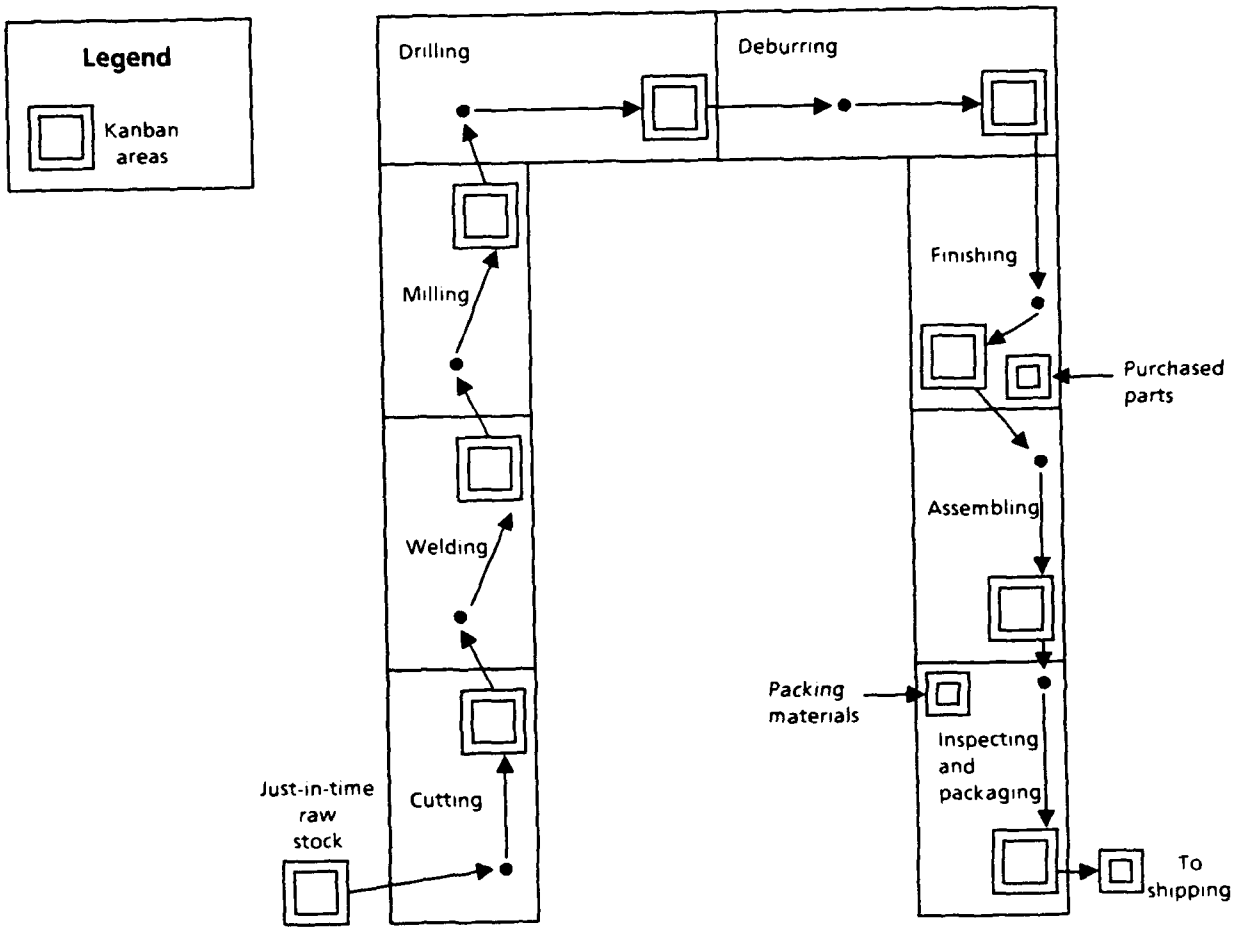


FIG. B-3. WORKFLOW DIAGRAM

PARETO CHARTS

In the late 1800s, Vilfredo Pareto, an Italian economist, found that typically 80 percent of the wealth in a region was concentrated in less than 20 percent of the population. Later, Dr. Joseph Juran formulated what he called the Pareto Principle of problems: only a vital few elements (20 percent) account for the majority (80 percent) of the problems. For example, only 20 percent of your equipment problems account for 80 percent of your downtime. Because this Pareto principle has proven to be valid in numerous situations, it is useful to examine your data carefully to identify the vital few items that most deserve attention.

A Pareto Chart (Figure B-4) is a bar chart in which the data are arranged in descending order of their importance, generally by magnitude of frequency, cost, time, or a similar parameter. The chart presents the information being examined in its order of priority and focuses attention on the most critical issues. The chart aids the decision-making process because it puts issues into an easily understood framework in which relationships and relative contributions are clearly evident.

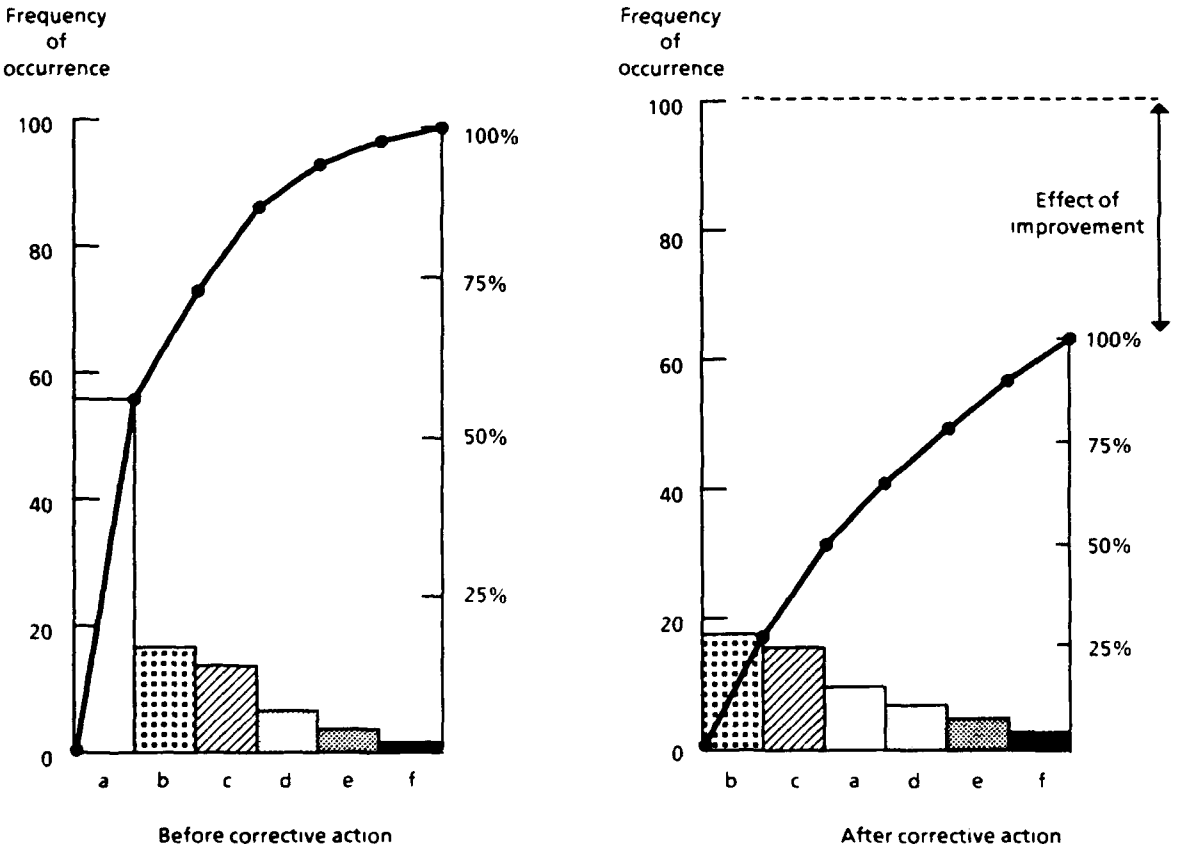


FIG. B-4. PARETO CHARTS

CAUSE-AND-EFFECT DIAGRAMS

The cause-and-effect diagram (Figure B-5) is a graphic representation of the relationships among a list of items or factors. It is a useful tool in brainstorming, examining processes, and planning activities. The process of constructing a cause-and-effect diagram helps stimulate thinking about an issue, helps organize thoughts into a rational whole, and generates discussion and the airing of viewpoints. The diagram documents the level of understanding about an issue and provides a framework from which to begin expanding that understanding.

Cause-and-effect diagrams can be used to explore a wide variety of topics including the relationships between an existing problem and the factors that might bear on it; a desired future outcome and the factors that relate to it; or any event past, present, or future and its causal factors.

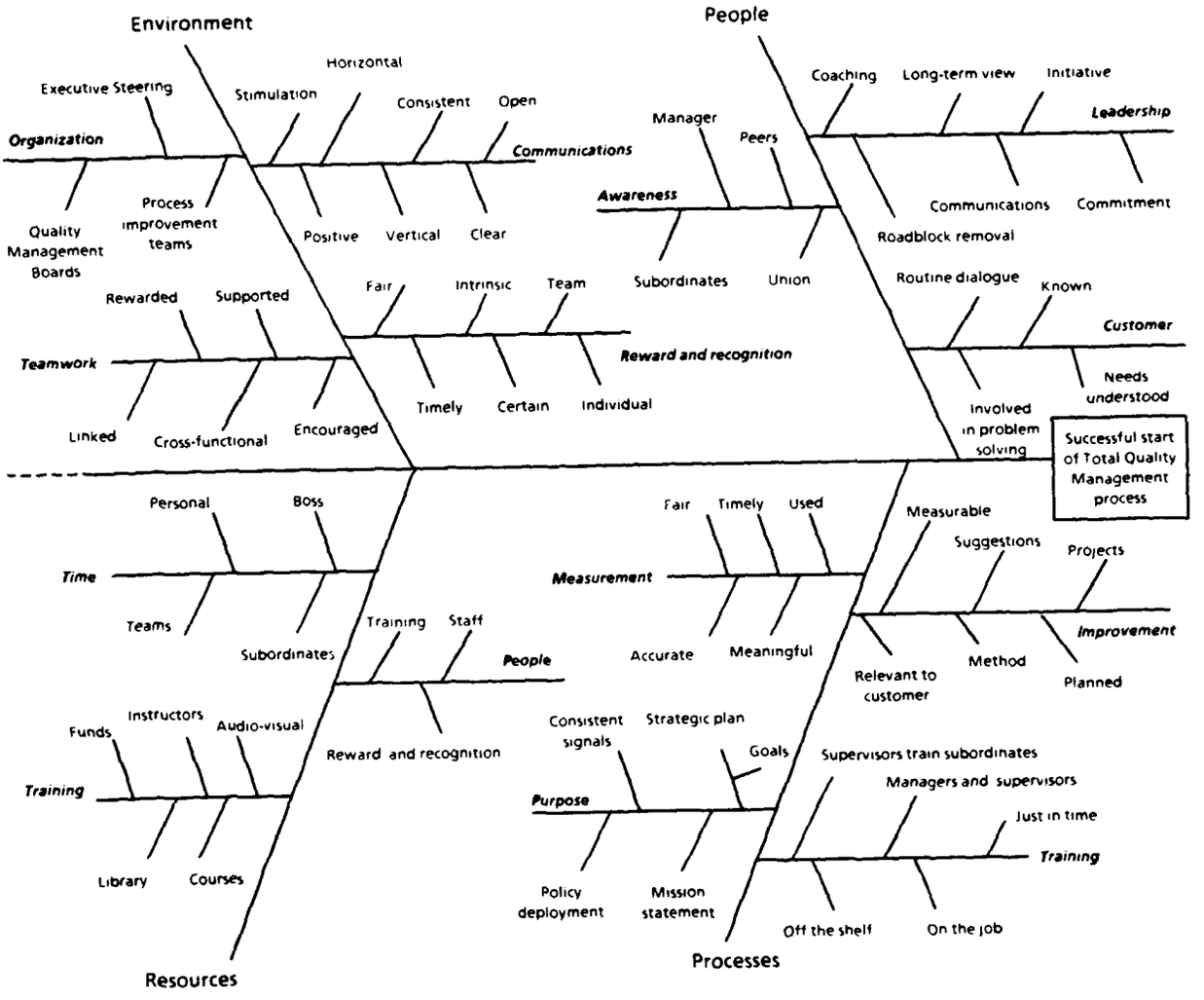
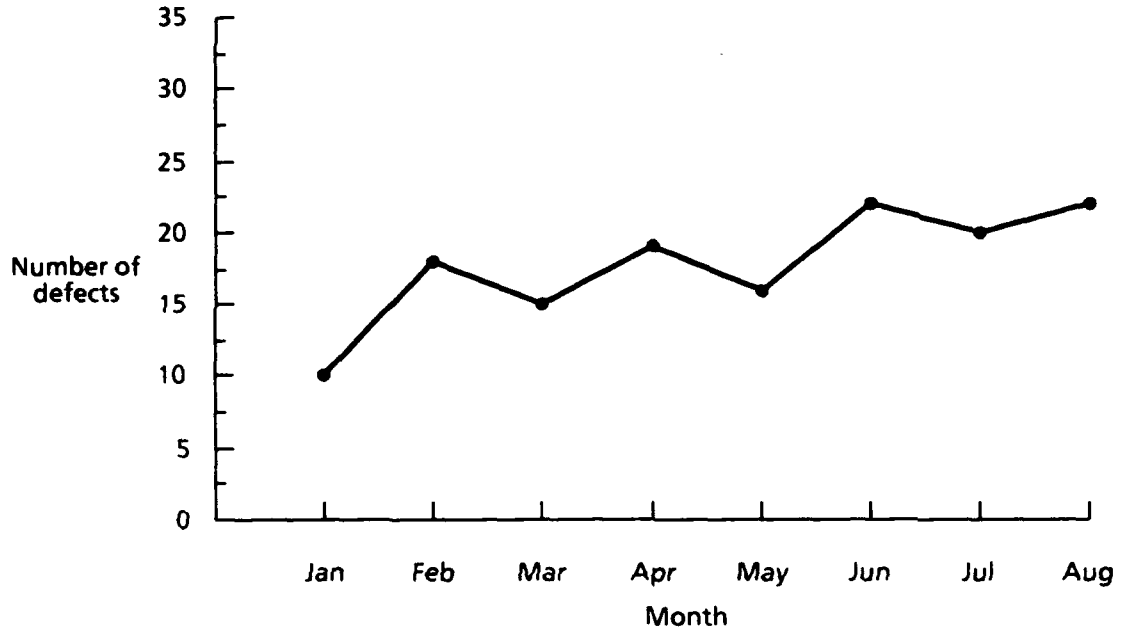


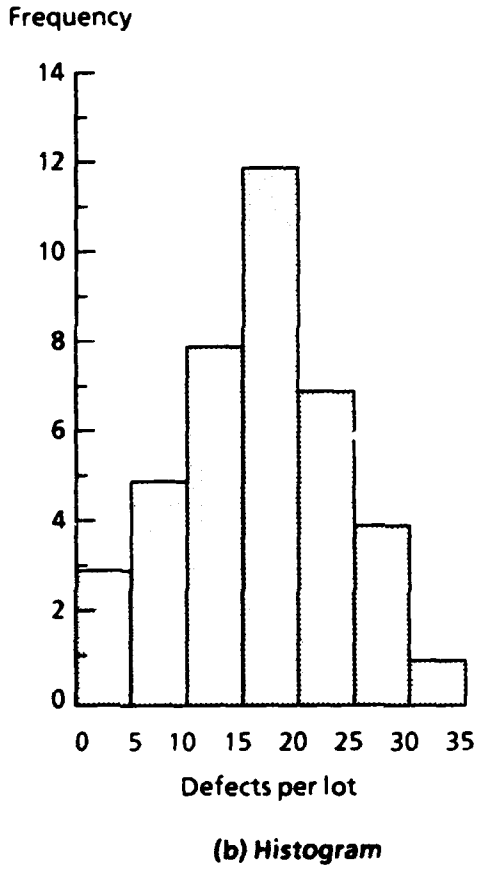
FIG. B-5. CAUSE-AND-EFFECT DIAGRAM

GRAPHS

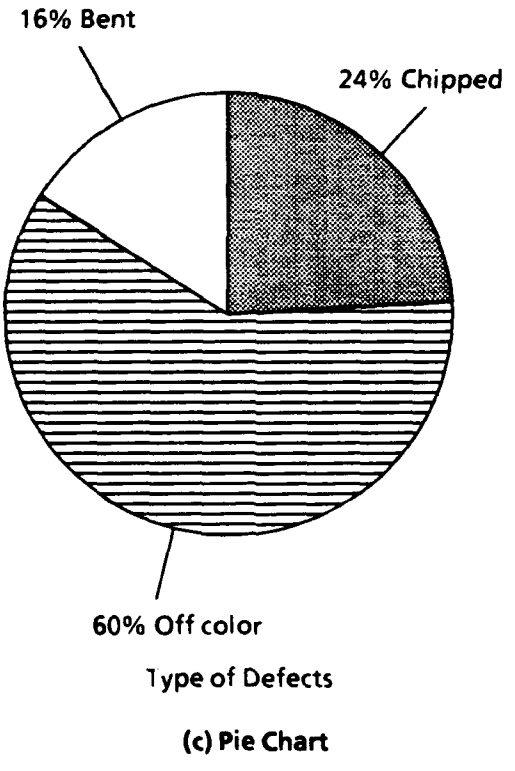
Many different types of graphs are available and useful to the improvement process. Figure B-6 shows some of the most common, such as the simple line graph (time plots or trend chart), pie chart, and bar chart, or histogram. Graphs are useful for presenting data in simple pictorial form that is quickly and easily understood. Graphs serve as powerful communications tools and should be employed liberally in the workplace to describe performance, support analyses, and document the improvement process.



(a) Line graph



(b) Histogram



(c) Pie Chart

FIG. B-6. GRAPHS

CONTROL CHARTS

A control chart (Figure B-7) is a graph that displays data taken over time and also shows computed variations of those data. Control charts are used to show the variation on a variety of variables including average (X) and range (R) and also the number of defects (PN), percent defective (P), defects per variable unit (U), and defects per fixed unit (C). Books by Ishikawa and Kume (see "Suggested Readings – Books" in the Reference Material presented at the end of the main text) provide excellent guidance on using these tools. The control chart allows you to distinguish between measurements that are predictably within the inherent capability of the process (common causes of variation) and measurements that are unpredictable and produced by special causes.

The upper and lower control limits (UCL and LCL) must not be confused with specification limits. Control limits describe the natural variation of the process such that points within the limits are generally indicative of normal and expected variation. Points outside the limits signal that something has occurred that requires special attention because it is outside of the built-in systemic causes of variation in the process. Note that the circled point on the X-bar chart, while outside the control limits, does not mean the process is out of control. A series of points outside control limits would be necessary for that determinate. Each individual point out of the limits should be explained, however.

These charts help you understand the inherent capability of your processes, bring your processes under control by eliminating the special causes of variation, reduce tampering with processes that are under statistical control, and monitor the effects of process changes aimed at improvement.

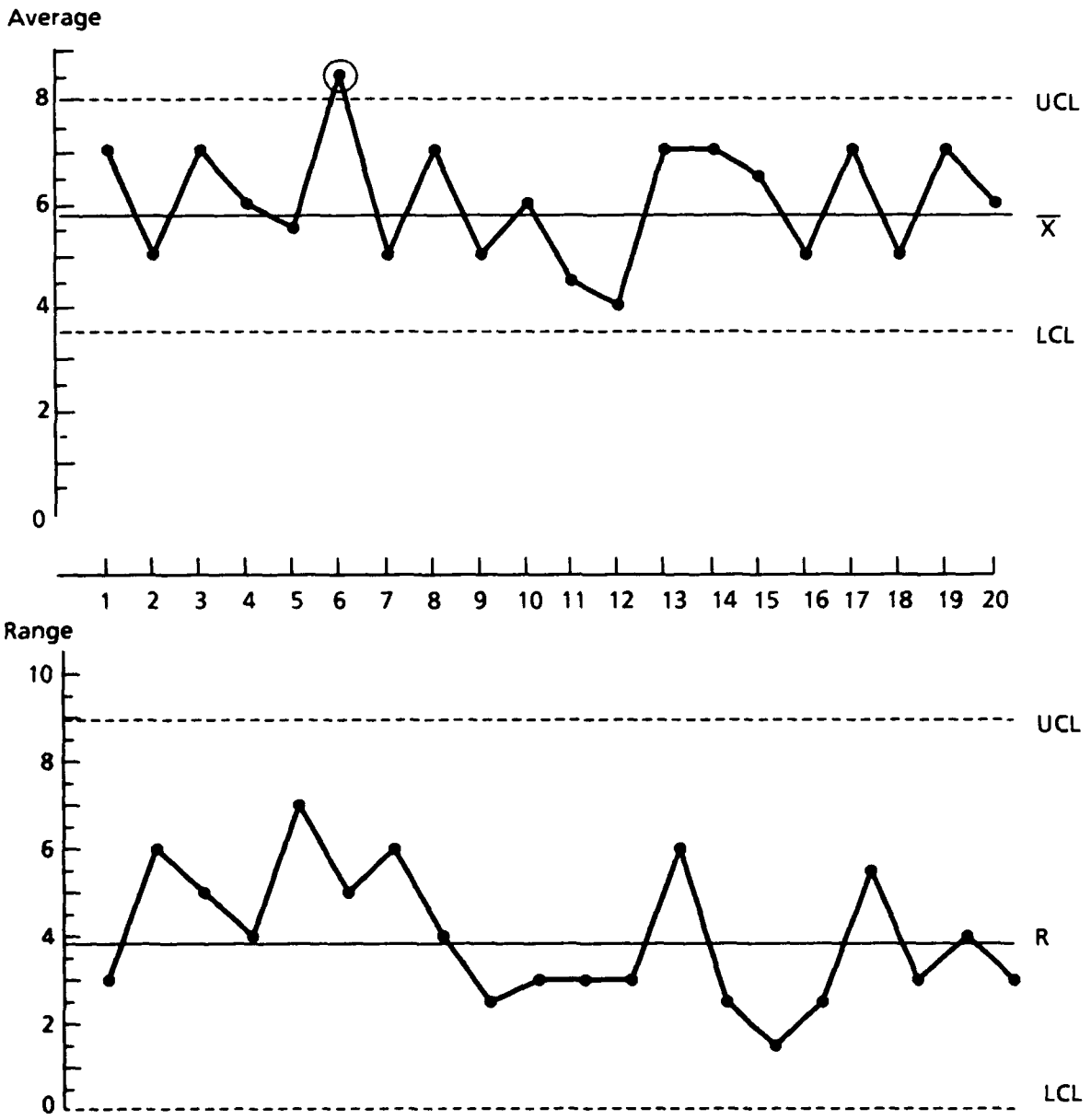
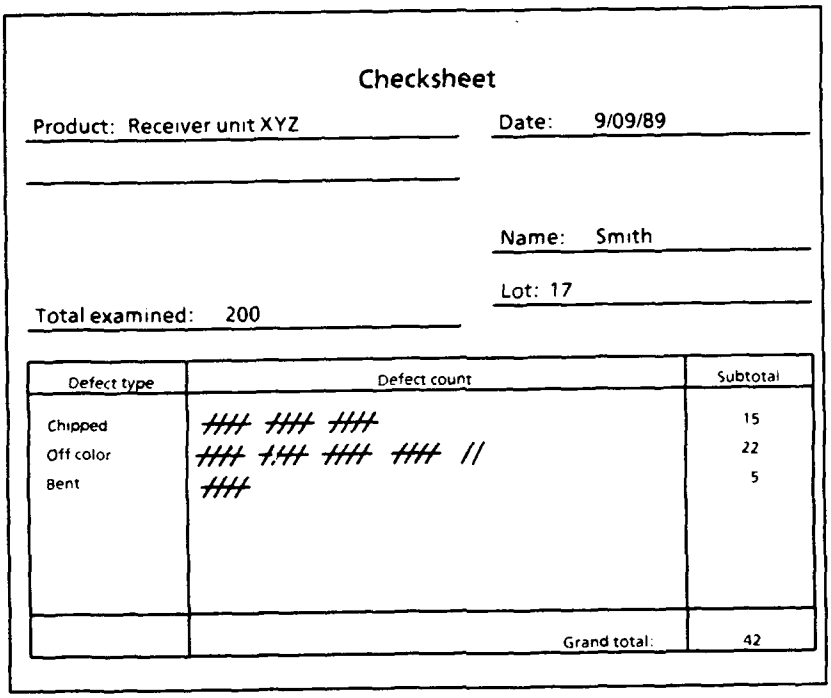


FIG. B-7. CONTROL CHARTS

CHECKSHEETS

A checksheet (Figure B-8) is a list of check-off items that permit data to be collected quickly and easily in a simple standardized format that lends itself to quantitative analysis. A checksheet frequently contains a graphic representation of an object and is used to record such information as where specific damage was located. Checksheets are intended to make data collection fast and easy. They should be carefully designed so that the data are useful and have a clear purpose. Checksheets are frequently used to collect data on numbers of defective items, defect locations, and defect causes.



Checksheet

Product: Receiver unit XYZ

Date: 9/09/89

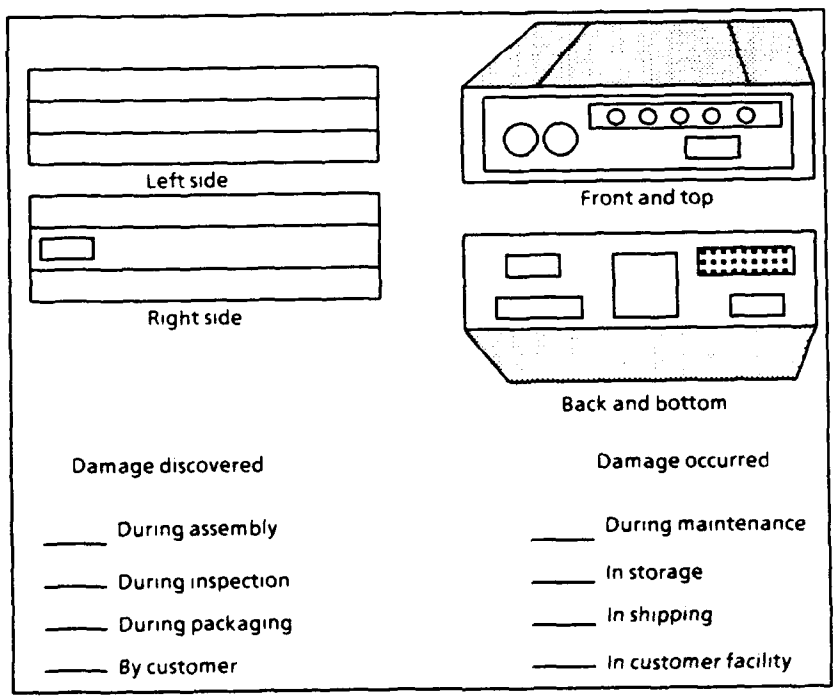
Name: Smith

Lot: 17

Total examined: 200

Defect type	Defect count	Subtotal
Chipped	𝍸 𝍸 𝍸	15
Off color	𝍸 𝍸 𝍸 𝍸 //	22
Bent	𝍸	5
	Grand total:	42

(a) Front



(b) Back

FIG. B-8. CHECKSHEET

SCATTER DIAGRAMS

Scatter diagrams (Figure B-9) and their related correlation analysis permit you to examine two factors at one time and to determine the relationship that may exist between them. The graphic display can help to lead you toward the possible causes of problems even when the linkage between the factors is counterintuitive. The pattern or distribution of data points in a scatter diagram describes the strength of the relationship between the factors being examined. However, even a strong correlation does not imply a cause-and-effect relationship between the factors. Additional work may be required to uncover the nature of the indicated relationship.

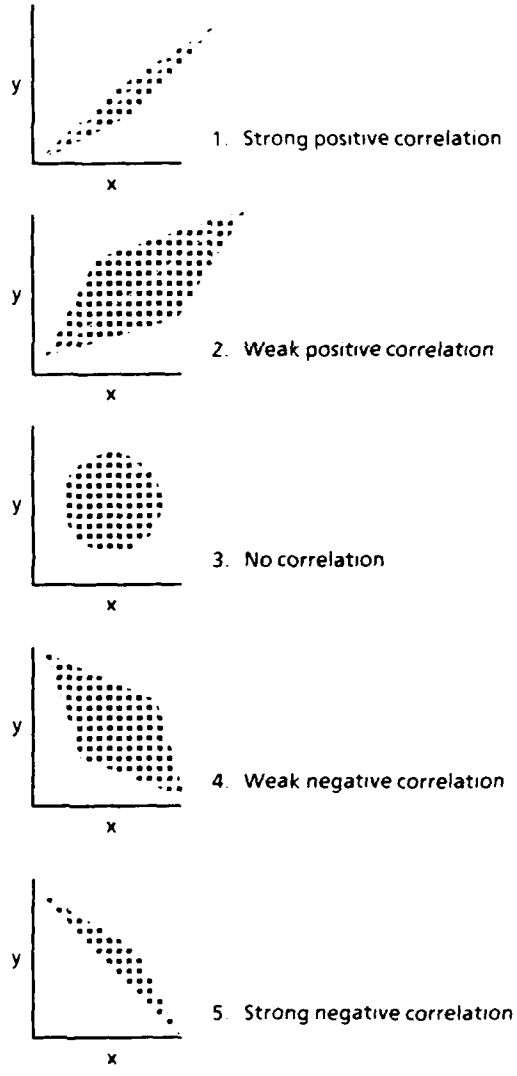


FIG. B-9. SCATTER DIAGRAMS

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Quality Management: A Guide to Implementation

ONAL AUTHOR(S)

n E. Mansir and Nicholas R. Schacht

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LEMENTARY NOTATION

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D	GROUP	SUB-GROUP	Quality, Management, Improvement, TQM, Continuous improvement, Process improvement

RACT (Continue on reverse if necessary and identify by block number)

al Quality Management (TQM) is a philosophy and a set of guiding principles and practices that represent the foundation of a continuously ing organization. It applies human resources and quantitative methods to improve the material and services supplied to an organization, all the es within an organization, and the degree to which the needs of the customer are met now and in the future. It integrates fundamental ement techniques, existing improvement efforts, and technical tools in a disciplined and focused continuous improvement process.

al Quality Management addresses the quality of management as well as the management of quality. It involves everyone in an organization in a atic long-term endeavor to develop processes that are customer oriented, flexible and responsive, and constantly improving in quality. Quality s any factor of product or service of value to a customer. Ultimately, TQM is a means through which an organization creates and sustains a culture ted to continuous improvement.

al Quality Management is a means for improving personal effectiveness and performance, and for aligning and focusing all individual efforts iout your organization. It provides a framework within which individuals may continuously improve everything they do and affect. It is a way of ing individual effort and extending its effect and its importance throughout an organization and beyond. (Continued over)

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1473, 84 MAR 83 APR edition may be used until exhausted. SECURITY CLASSIFICATION OF THIS PAGE

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19. Abstracts (continued)

Total Quality Management is not a destination but a journey toward improvement. This guidebook will help individuals get started on that journey. It will help them understand the benefits of continuous improvement and their roles and responsibilities in leading the improvement effort in their organizations. The authors briefly explore why continuous improvement is important to everyone. They offer a brief overview of TQM, describe a core set of individual and organizational behavior that has proven key to successful improvement efforts, and offer a general model for improvement efforts. This guide will serve as a frame of reference for the ongoing dialogue about TQM within DoD and its supplier community.